

Muir Mhòr Offshore Wind Farm

Environmental Impact Assessment Report

Non-Technical Summary



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Glossary

Term	Definition
Array Area	The area in which the generation infrastructure (including Wind Turbine Generators and associated foundations and inter-array cables), Offshore Electrical Platform(s) and an interconnector cable will be located.
Developer	Muir Mhòr Offshore Wind Farm Limited
E2	The ScotWind Plan Option Area where the Proposed Development is located
EIA Regulations	Collectively the term used to refer to The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017, The Marine Works (Environmental Impact Assessment) Regulations 2007, and The Marine Works (Environmental Impact Assessment) (Scotland) Regulations 2017.
Floating Foundations	The floating structures on which the Wind Turbine Generators are installed.
Foundation anchors	The structures which anchor the Floating Foundations to the seabed, connected to the foundation mooring.
Foundation mooring	The mooring structures which connect the Floating Foundations to the anchors.
Habitats Regulations	The Conservation (Natural Habitats, &c..) Regulations 1994, the Conservation of Offshore Marine Habitats and Species Regulations 2017 and the Conservation of Habitats and Species Regulations 2017
Horizontal Directional Drilling	A method of cable installation where the cable is drilled beneath a feature without the need for trenching.
Inter-array cables	Cables which link the Wind Turbines Generators to each other and the Offshore Electrical Platform(s).
Interconnector cable	Cable which links the Offshore Electrical Platforms to one another, allowing for power to be transferred between the platforms.
Landfall	The area between Mean High-Water Springs (MHWS) and Mean Low Water Springs (MLWS) where the offshore export cables are brought onshore.
Offshore Electrical Platform (OEP)	Offshore platform consisting of High Voltage Alternating Current (HVAC) equipment, details depending on the final electrical set up of the Project.
Offshore Export Cable Corridor (ECC)	The area within which the offshore export cables will be installed.
Offshore export cables	The subsea electricity cable circuits running from the Offshore Electrical Platform(s) to the landfall which will transmit the electricity generated by the offshore wind farm to the onshore export cables for transmission onwards to the onshore substation and the national electrical transmission system along with auxiliary cables such as fibre optic cables.
Offshore transmission infrastructure	The proposed transmission infrastructure comprising: Offshore Electrical Platform(s) and associated foundations and substructures; the offshore export cables; and the landfall area up to Mean High Water Springs (MHWS).
Project	Muir Mhòr Offshore Wind Farm – comprises the wind farm and all associated offshore and onshore components.
Proposed Development	The offshore Muir Mhòr Offshore Wind Farm project elements to which this Offshore EIAR relates.
Scottish Territorial Waters	The waters that extend 12 nautical miles from the Scottish coast. Scotland has sovereignty over this territorial sea, airspace, and seabed.
Wind Turbine Generator (WTG)	The wind turbines that generate electricity consisting of tubular towers and blades attached to a nacelle housing mechanical and electrical generating equipment.

Acronyms

Term	Definition
AL	Action Levels
COP	Conference of the Parties
ECC	Export Cable Corridor
eDNA	Environmental DNA
EEA	European Economic Area
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EPS	European Protected Species
EU	European Union
FL	Flight Level
GW	Gigawatt
HRA	Habitats Regulations Appraisal
HVAC	High Voltage Alternating Current
HVDC	High Voltage Direct Current
IAC	Inter Array Cable
IUCN	International Union for the Conservation of Nature
km	Kilometre
LAT	Lowest Astronomical Tide
m	Metre
MD-LOT	Marine Directorate - Licensing Operations Team
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
MPA	Marine Protected Area
MW	Megawatt
NATS	National Air Traffic Service
NERL	NATS [En-Route] plc
nm	Nautical Mile
O&M	Operation and Maintenance
OEP	Offshore Electrical Platform
OWF	Offshore Wind Farm
PAC	Pre-Application Consultation
PMF	Priority Marine Feature
PO	Plan Option
PSR	Primary Surveillance Radar
SMP	Sectoral Marine Plan
SPA	Special Protection Area
SPM	Suspended Particulate Matter
SSC	Suspended Sediment Concentration
UK	United Kingdom
UXO	Unexploded Ordnance
WTG	Wind Turbine Generator

1. INTRODUCTION

1.1. BACKGROUND

- 1.1.1. In response to the Scottish Government's target of net-zero emissions of all greenhouse gases by 2045 and the aim to generate 50% of Scotland's overall energy consumption from renewable sources by 2030, the Crown Estate Scotland launched the ScotWind Leasing process in 2021, which released new areas of seabed within Scottish waters for future offshore development. The ambition was to offer offshore wind generating capacity within a series of Plan Options, identified by the Scottish Government as the most suitable areas for development as set out within the Sectoral Marine Plan (SMP) for Offshore Wind Energy.
- 1.1.2. As part of the Crown Estate Scotland ScotWind leasing process in January 2022, the Developer (Muir Mhòr Offshore Wind Farm Limited - a joint venture between Fred. Olsen Seawind Limited and Vattenfall Wind Power Limited), was identified as the successful bidder and awarded an Option Agreement (granting exclusive rights for offshore wind development) for what the Developer has named the Muir Mhòr Offshore Wind Farm (hereafter 'the Project'), located within the E2 Plan Option (PO) area. The Muir Mhòr Array Area covers an area of approximately 200 km² and is located approximately 63 km east of Peterhead on the east coast of Scotland (Figure 1-1). The Project is anticipated to have a capacity of approximately 1 Gigawatt (GW) comprising floating offshore wind technology.
- 1.1.3. The Project is comprised of both the offshore and onshore infrastructure required to generate and transmit electricity from the Array Area to the National Grid. The subject of this Environmental Impact Assessment Report (EIAR) is the offshore infrastructure only (hereafter 'the Proposed Development').
- 1.1.4. The offshore infrastructure of the Proposed Development includes Wind Turbine Generators (WTGs) and associated floating foundations, the Offshore Electrical Platforms (OEP(s)) and associated foundations, the inter-array cables, an interconnector cable, offshore export cables and landfall.
- 1.1.5. The Developer is applying for the relevant consents and permissions required to enable construction, operation and maintenance and decommissioning of the Proposed Development.
- 1.1.6. A separate Muir Mhòr onshore EIAR has been prepared providing a description of the onshore elements of the Project and an assessment of any associated Likely Significant Effects.

1.2. THE DEVELOPER

- 1.1.7. The Developer (Muir Mhòr Offshore Wind Farm Limited) is an equal joint venture between Fred. Olsen Seawind Limited and Vattenfall Wind Power Limited. The Developer brings together a unique combination of financial, technical and project development capability, a commitment to delivery, and a clear vision for the Project.



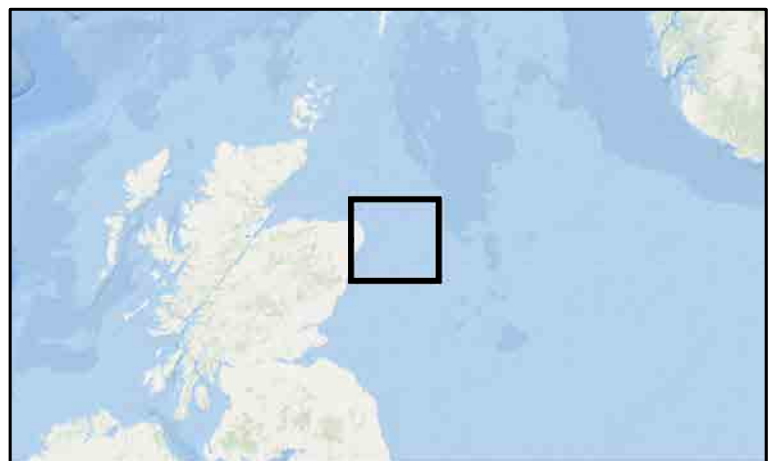
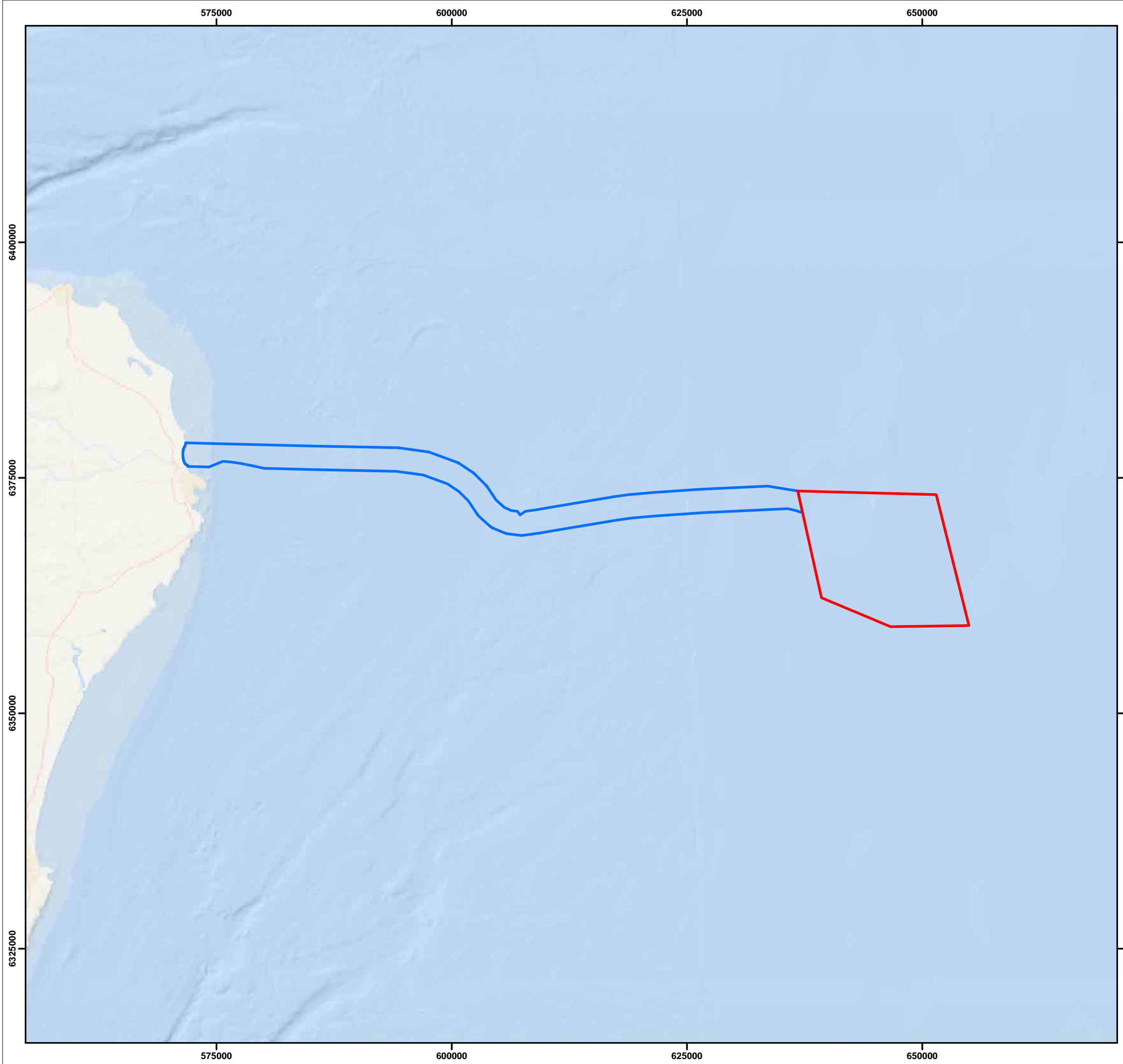
Fred. Olsen Seawind

VATTENFALL 

- 1.1.8. Fred. Olsen Seawind Limited is an established offshore wind developer building on Fred. Olsen Renewables' 25 years wind track record, market presence and portfolio. Fred. Olsen has extensive experience in Scotland gained through over 25 years of development,

construction, and operation of onshore wind in the region. Fred. Olsen Seawind is active in Ireland, Norway and Scotland and is exploring opportunities in new markets.

- 1.1.9. Vattenfall Wind Power Limited is one of Europe's largest producers and retailers of electricity and heat. Vattenfall Wind Power Limited has been working in the UK for more than ten years, developing fossil fuel-free energy projects. Vattenfall Wind Power Limited have grown their wind business from one project in 2008 to 11 in 2023. Vattenfall Wind Power Limited currently operates more than 1 GW of wind energy capacity in the UK. In Scotland, their operational wind farms comprise a total generating capacity of approximately 400 Megawatts (MW), powering over 130,000 homes. This includes the 96.8 MW European Offshore Wind Deployment Centre in Aberdeen Bay, offering the domestic supply chain the chance to test and demonstrate the latest innovations in a real-world environment. Vattenfall Wind Power Limited is also constructing South Kyle, a 240 MW onshore wind project in south-west Scotland.



Legend:

- Array Area
- Offshore Export Cable Corridor

Project: Muir Mhòr	Report: Non-Technical Summary
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**Muir Mhor Offshore Wind Farm -
Array Area and Export Cable Corridor**

Figure: 1-1	Drawing No: GoBe-0192		
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Map scale 1:400,000 @ A3

Co-ordinate system: ETRS 1989 UTM Zone 30N **EPSG:** 25830



1.3. PURPOSE OF THE DOCUMENT

- 1.1.10. This document is a Non-Technical Summary of the offshore EIAR prepared for the Proposed Development. The offshore EIAR provides the environmental information which has been gathered in order to carry out an assessment of the likely significant environmental effects of the Proposed Development.
- 1.1.11. This Non-Technical Summary is intended to act as a stand-alone document that will provide an overview of the environmental effects of the Proposed Development in non-technical language. For more detailed information, the full offshore EIAR should be referred to (see Volumes 1 to 4 of the offshore EIAR).

1.4. PURPOSE OF THE ENVIRONMENTAL IMPACT ASSESSMENT REPORT

- 1.1.12. The offshore EIAR provides a description of the Proposed Development and presents the environmental information which has been gathered in order to carry out an assessment of the likely significant environmental effects of the Proposed Development (seaward of MHWS) on the receiving environment.
- 1.1.13. The offshore EIAR specifically:
- Provides statutory and non-statutory consultees with technical information to facilitate understanding of the Proposed Development;
 - Presents the existing environmental baseline information, established from desktop studies, site-specific surveys and/or consultation;
 - Describes the Environmental Impact Assessment (EIA) methodology used for the assessments;
 - Presents the potential environmental impacts arising from the Proposed Development, based on baseline information and data gathered, and the analysis and assessment of likely significant effects, including consideration of cumulative, inter-related and transboundary effects, completed as part of the EIA process;
 - Outlines any limitations encountered during the compilation of the environmental information, including where any data gaps or deficiencies exist, and the level of confidence in the information gathered;
 - Identifies designed-in measures to avoid, prevent, reduce or, where possible, offset any identified significant adverse effects on the environment, and where appropriate, proposed monitoring arrangements to validate findings of the offshore EIAR. Where additional mitigation measures have been identified, the residual significance of effect has also been presented; and
 - Provides a description of the reasonable alternatives considered for the Proposed Development, and an indication of the main reasons for site-selection.
- 1.1.14. The offshore EIAR is divided into four volumes:
- Volume 1 – Introductory Chapters;
 - Volume 2 – Offshore EIAR Chapters;
 - Volume 3 – Offshore EIAR Technical Reports; and
 - Volume 4 – Supporting Documents.

- 1.1.15. Based on the Scoping Opinion received from the regulator, Marine Directorate - Licensing Operations Team (MD-LOT) and discussions with stakeholders, this offshore EIAR focuses on the following topic areas:
- Marine and Coastal Processes;
 - Marine Water and Sediment Quality;
 - Benthic Subtidal and Intertidal Ecology;
 - Fish and Shellfish Ecology;
 - Offshore and Intertidal Ornithology;
 - Marine Mammals;
 - Commercial Fisheries;
 - Shipping and Navigation;
 - Marine Archaeology and Cultural Heritage;
 - Military and Civil Aviation;
 - Socioeconomics, Tourism and Recreation;
 - Climate;
 - Infrastructure and Other Users; and
 - Major Accidents and Natural Disasters.
- 1.1.16. Based on the Scoping Opinion received and discussions with stakeholders the following topic areas were scoped out of the assessment:
- Seascape, Landscape and Visual Resources;
 - Offshore Airborne Noise and Vibration;
 - Offshore Air Quality; and
 - Health.
- 1.1.17. Throughout the EIA process, the Developer has undertaken extensive consultation with statutory and non-statutory stakeholders, and actively engaged with the public at multiple in-person and virtual public consultation events. Details of the consultation with statutory and non-statutory stakeholders and the public is presented in Volume 1, Chapter 5 (Consultation), together with a full list of stakeholders who were consulted. Topic-specific consultation is also provided in each topic Chapter (see Volume 2, Chapters 7 to 20). A summary of the consultation is presented in Section 5.

2. LEGISLATION AND POLICY CONTEXT

- 2.1.1. This Section presents a summary of Volume 1, Chapter 2 (Legislation and Policy Context) which contains the relevant policy and legislation context for the Proposed Development specifically in relation to:
- International obligations and policy, including those derived from European legislation, relating to climate change, reducing greenhouse gas emissions and the role of renewable energy;
 - UK and Scottish climate change and energy legislation and policy;

- Consenting legislation relating to Scottish offshore wind generation, including the consent applications required for the construction, operation and maintenance, and decommissioning of the Proposed Development; and
- Other legislation that may be relevant to the Proposed Development.

2.1. INTERNATIONAL POLICY AND LEGISLATION

UN FRAMEWORK CONVENTION ON CLIMATE CHANGE

- 2.1.1. The 28th Conference of the Parties (COP), 'COP28' took place in Dubai in 2023. The conference determined more work was required regarding global climate action, reiterating that governments must transition away from fossil fuels to renewables like wind and solar power for the next round of climate commitments (UNFCCC, 2024).

THE PARIS AGREEMENT

- 2.1.2. The Paris Agreement is a legally binding, international treaty on climate change, adopted at COP21 in December 2015, coming into force in November 2016. The Agreement aims to prevent the increase in global average temperature to no more than 2.5°C, as well as limiting temperature increase to 1.5°C, per year. There is an additional overall aim to reduce greenhouse gas emissions by 43% by 2030. The Paris Agreement also provides a framework for technical, financial, and capacity building support for representative countries (UNFCCC, 2024).

THE KYOTO PROTOCOL

- 2.1.3. The Kyoto Protocol commits industrialised countries to limit and reduce greenhouse gas emissions, using policies and mitigation measures based on principles and provisions of convention. These emission limits were agreed between the 192 parties for their respective countries. The protocol was adopted on December 11th, 1997, coming into force on February 16th 2005, amended in Doha on December 8th 2012. These amendments had a commitment period between 2013 to 2020, before coming into force December 31st, 2020 (UNFCCC, 2019).

2.2. EU LEGISLATION AND POLICY

EUROPEAN UNION EXIT

- 2.2.1. On the 31st of January 2020 the UK formally left the European Union (EU) after triggering Article 50 of the Lisbon Treaty. Subsequently the UK Government has committed to implementing international environmental obligations and maintaining existing environmental and legislative commitments in accordance with the European Union (Withdrawal) Act 2018.
- 2.2.2. The existing EU renewable energy targets for the UK remain the same since the EU Exit, including the EU Renewable Energy Directive 2009/28/EC. However, updated EU legislation to existing directives will not be required to be transposed into UK law.

EU RENEWABLE ENERGY DIRECTIVE

- 2.2.3. The 'EU Renewable Directive' was the first legal framework created for the development of clean energy sectors of the EU Economy. The EU is required to revisit the directive regularly

to ensure the right measures are being put in place and utilized. The current directive sets a renewable energy target of at least 42.5% (aiming for 45%) utilization by 2030.

2.3. UK LEGISLATION AND POLICY

2.3.1. The following UK legislation and policy is applicable to the Proposed Development. These instruments are briefly summarised below.

- The Climate Change Act 2008 committed the UK to a net reduction in greenhouse gas emissions by 34% of 1990 emissions by 2022, and an 80% reduction by 2050. The Act was then amended in 2019, requiring a reduction in emissions by 100% of 1990 baseline emissions. The Act's legal framework implements a delivery pathway to net zero by 2050, and 40 GW of offshore wind by 2050 (UK Parliament, 2011);
- The British Energy Security Strategy sets out the UK Government's ambition to deliver up to 50 GW of offshore wind energy development by 2030, including up to 5 GW of innovative floating wind, which aligns with Scottish Government's National ambitions of the same;
- The Energy Act 2013: makes provisions to incentivise investment in low carbon electricity generation, ensure security of supply, and help the UK meet its emission reduction and renewables targets; and
- The Energy Act 2023 makes provisions to enhance energy security, affordability, and sustainability. The Act is designed to support the UK's transition to a cleaner, more resilient energy system.

2.4. SCOTTISH LEGISLATION AND POLICY

2.4.1. The following Scottish legislation and policy is applicable to the Proposed Development. These instruments are briefly summarised below.

- The Climate Change (Scotland) Act 2009 and Climate Change (Emissions Reduction Targets) (Scotland) Act 2019: introduces binding targets on the Scottish Government to reduce net Scottish greenhouse gas emissions by at least 100% by 2045 from 1990 levels;
- Scotland's National Marine Plan was published in March 2015 and details strategic policies for the sustainable development of Scotland's marine resources out to 200 nm. It is required to be compatible with the UK Marine Policy Statement and existing marine plans across the UK;
- The National Planning Framework 4 received government approval in January 2023 and was adopted in February 2023. NPF4 sets spatial principles, regional priorities, national developments, and national planning policy for onshore developments, and is highly supportive of all forms of renewable energy, including offshore wind. Policy 11 within NPF4 explicitly encourages renewable energy projects, emphasising the expansion of low-carbon and zero-emission technologies.
- The Marine (Scotland) Act 2010 enables the delegation of regional marine planning to a party nominated by Scottish Ministers. Regional Marine Plans are therefore delivered by Marine Planning Partnerships but adopted by Scottish Ministers. If an RMP for the North East Marine Region were to be adopted in the future, the Developer will ensure compliance with relevant policies.

- The Scottish Energy Strategy: The Future of Energy in Scotland (Scottish Government, 2017) outlines the Scottish Government's vision for the future energy system in Scotland. Renewable energy and low carbon energy solutions are two of six defined priorities. By 2030 Scotland aims to produce 50% of its heat, transport, and electricity consumption from renewable sources;
- The Scottish Offshore Wind Energy Policy Statement (Scottish Government, 2020), building upon the ambitions outlined within the Scottish Energy Strategy (Scottish Government, 2017) sets out the Scottish Government's ambition to capitalise on the potential that offshore wind development can bring to Scotland and the role this technology could play in meeting the commitment to reach net zero by 2045; and
- Aligned with global principles of sustainable development, Scotland's Blue Economy Vision focuses on leveraging the nation's extensive marine and coastal resources to drive sustainable economic growth, environmental stewardship, and social well-being.

SECTORAL MARINE PLAN FOR OFFSHORE WIND ENERGY

- 2.4.2. The Sectoral Marine Plan (SMP) for Offshore Wind Energy (Scottish Government, 2020a), published in October 2020, provided the strategic framework for offshore wind development in Scotland. It identified the most sustainable Plan Option for the future development of commercial-scale offshore wind energy in Scotland, including deep water wind technologies and covered both Scottish inshore and offshore waters.
- 2.4.3. In the recent ScotWind Leasing process, a total of 20 proposed OWF projects were awarded option agreements within 15 of these PO reaching ~30 GW of capacity. This includes 17 proposed OWF projects awarded in January 2022, with a further three sites awarded in August 2022 as part of the ScotWind 'Clearing' process.

2.5. CONSENTING PROCESS AND ASSOCIATED LEGISLATION

- 2.5.1. The consents, licences and permissions which will be sought by the Developer for the Proposed Development include:
- A Section 36 consent under the Electricity Act 1989;
 - A Marine Licence under the Marine and Coastal Access Act 2009 for the generating assets of the Proposed Development which are located beyond 12 nm limit within the EEZ; and
 - A Marine Licence under the Marine (Scotland) Act 2010 for the offshore transmission infrastructure, which is within 12 nm of the coast, and under the Marine and Coastal Access Act 2009 for the offshore transmission infrastructure located beyond the 12 nm limit within the EEZ.
- 2.5.2. Should additional pre-construction licences be required, these will be discussed and agreed with the relevant consent authority during the pre-construction phase of the Proposed Development.

SECTION 36 CONSENT

- 2.5.3. As the Proposed Development is an offshore generating station greater than 50 MW capacity and located in the Scottish offshore waters (12 nm to 200 nm) within the Scottish Renewable

Energy Zone (REZ), there is a requirement for consent under Section 36 of the Electricity Act 1989. Section 36 will allow for the installation, operation and maintenance of the following:

- Wind turbines and their supporting structures;
- Wind turbine anchors and mooring systems;
- OEP(s); and
- Inter-array cables.

2.5.4. A detailed description of these components is provided in Volume 1, Chapter 3 (Project Description).

MARINE LICENSING

2.5.5. The Marine and Coastal Access Act 2009 provides devolved authority to Scottish Ministers for marine planning and conservation powers in the Scottish Offshore Region (from 12 to 200 nm). Under Section 66 of the Marine and Coastal Access Act 2009 (in the context of the Scottish Offshore Region), the Proposed Development requires a Marine Licence for the construction and deposit of structures beyond 12 nm.

2.5.6. The Marine (Scotland) Act 2010 provides the legislative and management framework for the marine environment within Scottish Territorial Waters (from MHWS out to 12 nm). Under Section 21 of the Marine (Scotland) Act 2010, the Proposed Development requires a Marine Licence for the construction and deposit of structures below MHWS.

THE TOWN AND COUNTRY PLANNING (SCOTLAND) ACT 1997

2.5.7. The Developer plans to submit separate applications for the offshore and onshore elements of the Project. The onshore elements of the Project will require separate planning consent under the Town and Country Planning (Scotland) Act 1997 as amended. The onshore application will be submitted to Aberdeenshire Council.

ENVIRONMENTAL IMPACT ASSESSMENT REGULATIONS

2.5.8. Under the EIA process, an EIAR is required to be prepared and submitted to support applications for a Section 36 consent as part of the EIA process, together with a marine licence or planning permission relating to offshore renewable energy developments if the proposed activities are likely to have a significant effect on the environment due to factors such as the size, nature or location of the proposal. The aim of the EIA Directive, the requirements of which are incorporated into Scottish law by the EIA Regulations, is to ensure that any consenting authority gives due consideration to likely significant effects on the environment when giving consideration to or giving consent for a proposed project. Due to the size, scale and location of the Proposed Development an EIA is required and an EIAR has been submitted as part of the Section 36 and marine licence applications.

2.6. OTHER CONSENTS AND LEGISLATION

PRE-APPLICATION CONSULTATION (PAC)

2.6.1. Where activity is planned within Scottish Territorial Waters, the Marine Licensing (Pre-application Consultation) (Scotland) Regulations 2013 (hereafter referred to as the PAC Regulations) apply. There is no provision for PAC in the MCAA 2009, so these requirements do not apply in respect of relevant applications in the Scottish Offshore Region. There are no

statutory requirements for consultation during the pre-application stage for Section 36 consent applications, however the principles of the PAC Regulations have been followed for all offshore components of the Proposed Development. Further information is provided in Volume 1, Chapter 5 (Consultation) and Volume 4, Appendix 1 (Pre-Application Consultation Report).

THE HABITATS AND BIRDS DIRECTIVES

- 2.6.2. The Council Directive (92/43/EEC) (the Habitats Directive) was adopted in 1992, offering a means for the EU to meet its obligations under the Bern Convention. The Habitats Directive provides for the conservation of natural habitats and of wild flora and fauna, including offshore waters. This protection is granted through the designation of European sites and European Protected Species (EPS).
- 2.6.3. The European Directive (2009/147/EC) on the conservation of wild birds (The Birds Directive) provides a framework for the conservation and management of wild birds in Europe, including their eggs, nests and habitats.
- 2.6.4. Under the Habitats Regulations, a network of protected sites for birds and certain habitats and species have been established in the UK. Following EU Exit, the network of sites is collectively known as the Natura 2000 network (where the sites are located within Member State countries) and the National Site Network where the sites are located within the UK. These sites are hereafter collectively (whether located in the UK or the EU) referred to as 'European sites' and include:
- Special Areas of Conservation (SACs), candidate SACs or proposed SACs;
 - Special Protection Areas (SPAs) or proposed SPAs;
 - Sites of Community Importance (SCIs); and
 - Ramsar sites (where also designated as one of the above).

HABITATS REGULATIONS APPRAISAL (HRA)

- 2.6.5. In situations where a plan or project is likely to have a significant effect on a European site, the competent authority (Marine Directorate) is required, under the Habitats Regulations, to carry out an 'appropriate assessment'. Further information on the Habitats Regulations is provided by the Developer in the Muir Mhòr Offshore Wind Farm Report to Inform Appropriate Assessment which accompanies this offshore EIAR and has not been re-iterated here.

MARINE PROTECTED AREAS (MPAS)

- 2.6.6. Under the Marine (Scotland) Act 2010 and the Marine and Coastal Access Act 2009, MD-LOT is required to consider whether a licensable activity can affect (other than insignificantly) a protected feature of a Nature Conservation Marine Protected Area (NC MPA) or any protected ecological or geomorphological process on which the conservation of any protected feature of an NC MPA is dependent. Impacts on relevant NC MPAs are considered within the Volume 3, Appendix 9.2 (Marine Protected Area Assessment Report).

EUROPEAN PROTECTED SPECIES (EPS) LICENCE

- 2.6.7. EPS are animals and plants listed within Annex IV of the Habitats Directive and as such protected under the Habitats Regulations. All cetacean species (whales, dolphins and porpoises) are EPSs. If an activity is likely to cause disturbance or injury to an EPS, a licence is required to legally undertake the activity.

THE WATER FRAMEWORK DIRECTIVE

- 2.6.8. Activities that have the potential to cause ecological stress to waterbodies (ground and otherwise) have a requirement to follow the 'Water Framework Directive' which was established in 2000 and aims to prevent the deterioration and enhance the status of aquatic ecosystems, including ground water (NatureScot, 2020). In relation to the Proposed Development, this piece of legislation covers certain activities in coastal waters (3 nm from the limit of the highest tide (Scottish Environmental Protection Agency, 2018).
- 2.6.9. In compliance with the Water Framework Directive, a report has been submitted as part of the offshore EIAR, see Volume 3, Appendix 8.1 (Water Framework Directive Report).

3. DESCRIPTION OF THE PROPOSED DEVELOPMENT

3.1. INTRODUCTION

- 3.1.1. This Section provides a summary of Volume 1, Chapter 3 (Project Description), which provides a description of the offshore components and methodology for the Proposed Development. This offshore EIAR has followed the design envelope approach, which provides flexibility by assessing the project on the basis of the maximum project design parameters, while ensuring all likely significant effects are assessed within the EIA.
- 3.1.2. Based on this, Volume 1, Chapter 3 (Project Description) and the summary below presents the maximum extent of the design as a basis to determine what the likely worst-case effects may be, noting that for some technical topics the worst case might be a combination of parameters, not just the maximum parameter, as explained and assessed in Volume 2, Chapters 7 to 20.
- 3.1.3. The operational lifetime of the Proposed Development is anticipated to be approximately 35 years.

3.2. PROPOSED DEVELOPMENT OVERVIEW

- 3.2.1. The Proposed Development will be located in the North Sea, with the Array Area situated approximately 63 km due east of the Peterhead coastline, detailed in Figure 1-1. The offshore infrastructure of the Proposed Development includes wind turbines and associated floating foundations, the Offshore Electrical Platforms (OEP(s)) and associated foundations, the inter-array cables, an interconnector cable, offshore export cables and landfall just north of Peterhead.

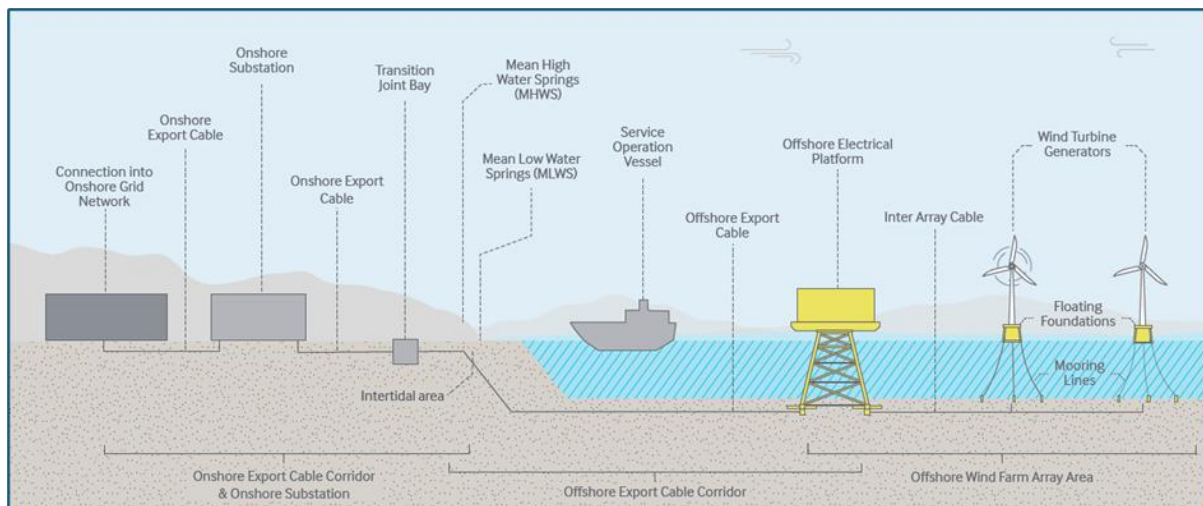


Figure 3-1 Indicative Project Overview

3.2.2. The Project is split into four distinct areas, which are detailed below:

- **Array Area:** This is the offshore energy generation site, where the following key infrastructure is located:
 - Up to 67 wind turbines on floating foundations comprising of tower Section, nacelle, hub, three blades and associated floating foundations;
 - Anchors and mooring lines system for each floating foundation;
 - Up to 250 km of inter-array cables, which connect the individual wind turbines to each other and then to the OEP(s); and
 - Up to two OEP(s), where the inter-array cables transition to the export cables. It is envisaged that a single interconnector cable of up to 3 km in length may connect the OEP(s).
- **Offshore Export Cable Corridor (ECC):** This is the offshore area containing the offshore export cables which connect the Array Area to the grid connection point on the Scottish mainland.
 - The offshore ECC includes all the export cabling seaward of Mean High Water Springs (MHWS) to the OEP within the Array Area.
 - There are up to three offshore export cables, each up to 90 km in length.
- **Intertidal Area:** This is the area between MHWS and Mean Low Water Springs (MLWS) where the offshore export cable transitions towards landfall and the onshore infrastructure.
 - The offshore export cables will cross the intertidal area via Horizontal Directional Drilling.
- **Onshore ECC & Onshore Substation**
 - The Onshore ECC & Onshore Substation are located landward of MLWS and are therefore considered part of the onshore EIAR, submitted separately by the Developer.

3.3. OFFSHORE INFRASTRUCTURE

3.3.1. The Proposed Development will comprise up to a maximum of 67 floating wind turbines (Figure 3-2) which will comprise a horizontal axis rotor with three blades connected to the nacelle of the wind turbine. The maximum rotor blade diameter will be no greater than 300 m,

with a maximum blade tip height of 340 m above Mean Sea Level (MSL) and a minimum blade tip clearance of 30 m above MSL. It is proposed that the wind turbines will be painted yellow from the water line up to the tower structure and the remaining parts of the structure will be painted light grey.

- 3.3.2. The layout of the wind turbines will be developed to best utilise both the available wind resource, suitability of seabed conditions and wake effects, while seeking to minimise environmental effects and impacts on other marine users (such as fisheries, shipping routes and Search and Rescue operations) where possible.

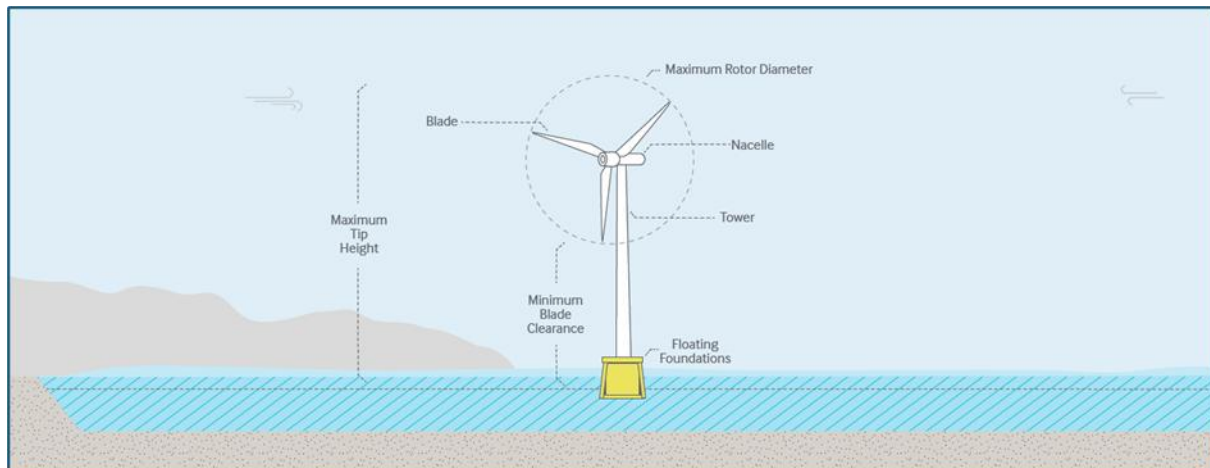


Figure 3-2 Wind Turbine Generator Overview

- 3.3.3. The floating foundation supporting the wind turbines will be tethered to the seabed via multiple mooring lines connected to anchors. The mooring and anchoring systems will maintain the position of the wind turbine and foundation.
- 3.3.4. Inter-array cables will carry the electrical current produced by the wind turbines to the OEP(s). It is proposed that up to a maximum of 250 km of inter-array cabling will be required for the Proposed Development. As the foundations for the wind turbines are floating, the section of the inter-array cables within the water column are 'dynamic' cables; this is because within the water column the cable needs to be flexible to accommodate the movement of the floating foundation.
- 3.3.5. The Proposed Development will require up to two OEP(s), which transform electricity generated by the wind turbines to a higher voltage and thereby allowing the power to be efficiently transmitted to shore. The size of the platforms' topsides will depend on the final electrical design but maximums could be up to 60 m (length) by 50 m (width), and up to 60 m in height (above Highest Astronomical Tide (HAT)), excluding the helideck, antenna structure or lightning protection. It is proposed that the OEP(s) foundations will be painted yellow from the water line up to the topside structure and the topside will be painted light grey.
- 3.3.6. The OEP(s) foundations will comprise either piled jacket or suction caisson jacket foundations. The final choice of foundation will depend on ground conditions, wave and tidal conditions, economic factors and procurement approach.
- 3.3.7. Scour protection may be installed around anchors and OEP foundations to prevent seabed erosion and the development of scour holes. Several forms of scour protection are being considered, which include concrete mattresses, rock placement and artificial frond mattresses.
- 3.3.8. If the Proposed Development requires two OEP(s), a single interconnector cable with a maximum length of 3 km may be used to transfer power between the OEP(s), which helps to provide redundancy in the electrical transmission system.

- 3.3.9. Offshore export cables will transfer the power from the OEP(s) to the transition joint bay at landfall, where they become onshore export cables. A maximum of three offshore export cables is being considered as part of the Proposed Development, with a maximum total length of 270 km. Although the offshore export cable corridor for the Proposed Development has been identified, the exact route of the offshore export cables is yet to be determined and will be based upon geophysical and geotechnical survey information.
- 3.3.10. Cable protection will be used to prevent movement of the cables over the lifetime of the Proposed Development and provide protection to cables when target cable burial depths are not achieved due to seabed conditions. This will protect cables from other activities such as fishing or anchor placement, dropped objects, and limit the effects of heat and/or induced magnetic fields.
- 3.3.11. Up to nine cable or pipeline crossings may be required for the offshore export cables. This will be facilitated by the installation of standard cable crossing designs, likely to be comprised of concrete mattresses or rock.

3.4. SITE PREPARATION ACTIVITIES

PRE-CONSTRUCTION SURVEYS

- 3.4.1. Prior to the four-year construction phase, several pre-construction surveys will be undertaken to identify in detail:
- Seabed conditions and morphology;
 - Presence/absence of any potential obstructions or hazards; and
 - To inform detailed project design work.
- 3.4.2. These geophysical and geotechnical surveys will be conducted across the Array Area and offshore ECC and are expected to have a duration of three months.

CLEARANCE OF UNEXPLODED ORDNANCE

- 3.4.3. The presence of Unexploded Ordnance (UXO) poses a health and safety risk where it coincides with the planned location of infrastructure and associated vessel activity, and therefore it is necessary to survey for and carefully manage UXOs.
- 3.4.4. Where it is not possible to avoid or relocate a UXO, the preferred method for UXO clearance is for a low order technique. Further information on this is provided in Volume 1, Chapter 3 (Project Description).

BOULDER CLEARANCE

- 3.4.5. Boulder clearance is commonly required during offshore wind farm site preparation. A boulder is typically defined as being over 200 mm in diameter/length. Boulder clearance may be required along the inter-array, interconnector, and export cable routes. It may also be required in the vicinity of the foundation locations (including within the jack-up vessel zone around the foundation locations), in order to avoid disruption to installation activities and to ensure stability for the jack-up vessel. Furthermore, offshore cable routes may be pre-ploughed for the removal of boulders or, alternatively, clearance may be undertaken using a boulder grab.

3.5. CONSTRUCTION PHASE

- 3.5.1. Anchor and mooring installations are expected to commence up to one or two years prior to the floating foundations and wind turbines being installed. This enables foundation and wind turbine installation activities to be completed in more favourable weather conditions and optimises the overall construction process, including reducing the number of vessels required on site.
- 3.5.2. The floating foundations and wind turbines are likely to be assembled or marshalled in a large construction port. Once assembly is completed, they will be floated-off to free up quayside and storage space at the port facility. The floating foundations will be 'wet stored' in a suitable sheltered area which is expected to be in within port authority boundaries for up to two years. The final phase is to tow out the complete wind turbines to the Array Area and hook-up to the mooring lines and cabling.
- 3.5.3. An alternative to the described process above is for a "floating to floating" installation method, whereby foundations are directly deployed to the Array Area from a vessel and connected to the mooring lines. A Heavy Lift Vessel could also then be used to directly install the wind turbine onto the foundation.
- 3.5.4. To optimise the installation process there is the potential that the inter-array cable could be pre-installed and wet stored for up to 18 months, allowing a similar hook-up method to the fully integrated wind turbine unit as is anticipated for the moorings. The IAC will be buried along their static length and any additional protection installed. Following connection of the IAC to the fully integrated WTG unit, there is a period of termination and testing to complete the IAC installation.
- 3.5.5. The OEP foundation will be installed using a Heavy Lift Vessel, with the foundation delivered to the Array Area on a barge or Heavy Transport Vessel. The OEP topside installation is anticipated to follow the same installation vessel and delivery methods as for the foundation.
- 3.5.6. The offshore export and interconnector cables will follow a similar installation method to the inter-array cables and will also potentially be pre-installed and wet stored for up to 18 months prior to pull in of the cables to the OEP.
- 3.5.7. It is expected that the commissioning and energisation of wind turbines will be phased across the Array Area, allowing connected WTGs to commence production of electricity as soon as is allowable following testing.
- 3.5.8. An indicative construction programme of up to five years is presented in the offshore EIAR. Although construction activities will typically occur sequentially there are expected to be periods where certain construction activities occur concurrently.

3.6. OPERATION AND MAINTENANCE PHASE

- 3.6.1. It is expected the Proposed Development will have an operational lifetime of approximately 35 years. The overall operation and maintenance strategy will be finalised once the operation and maintenance base location and technical specification of the Proposed Development are known, including wind turbine type, electrical export option and final project layout.
- 3.6.2. During the operational lifetime of the Proposed Development, regular maintenance activities will be required. Volume 1, Chapter 3 (Project Description) provides a description of the foreseeable planned and unplanned maintenance activities.
- 3.6.3. For major component replacement and large corrective maintenance issues, one advantage of floating wind is that the foundation and WTG can be disconnected from the mooring lines and cabling and towed-to-shore, allowing maintenance to be completed in a port facility.

- 3.6.4. A range of maintenance vessels will be used over the lifetime of the Proposed Development. This will be developed at a later stage once further detail is confirmed for the Proposed Development.

3.7. DECOMMISSIONING PHASE

- 3.7.1. At the end of the operational lifetime of the Proposed Development, it is anticipated that the wind turbines and their floating foundations will be removed in a reversal of their installation process, similar for the mooring lines. The removal of anchors which are fully embedded in the seabed may not be feasible, with the potential for piled anchors (if used) to be cut at an agreed depth below the seabed and the remaining buried Section of the pile left in place. The optimum approach will be agreed via consultation with relevant stakeholders and will follow industry practice guidance at the time of decommissioning.
- 3.7.2. The OEP topside and jacket foundation will both be fully removed from site. It is anticipated that OEP foundations' piles will be cut 1-2 m below seabed and the remainder of the pile left in-situ. Suction caisson foundations will be fully removed. As the decommissioning programme will be updated during the lifespan of the Proposed Development, it may be decided, closer to the time of decommissioning, that removal will result in greater environmental impacts than leaving offshore components such as buried cables in place.
- 3.7.3. The decommissioning sequence will generally be the reverse of the construction sequence and involve similar types and numbers of vessels and equipment and is expected to take approximately three years.

3.8. EMBEDDED COMMITMENTS

- 3.8.1. The design envelope includes a number of embedded commitments which have been included in the Proposed Development and are committed to be delivered by the Developer as part of the Proposed Development.
- 3.8.2. The embedded commitments for the Proposed Development include a range of measures used to reduce potential impact pathways. For example, a key designed in measure is the use of soft start piling procedures in order to reduce impacts to receptors that are sensitive to underwater noise (e.g. marine mammals and some fish species) by allowing receptors in the vicinity to flee the area before noise levels increase to thresholds that may cause injury or mortality.
- 3.8.3. Another key example of a designed in measure is an increased air gap between the lower wind turbine blade tip height and sea surface which reduces the risk of seabird collision impacts (and therefore seabird mortality) as an increased proportion of birds fly below the wind turbine rotor height. A full description of all embedded commitments is presented in Volume 3, Appendix 6.1 (Commitments Register). Embedded commitments that are relevant to specific topics have also been listed in the topic Chapters (Volume 2, Chapter 7 to 20).

4. SITE SELECTION AND CONSIDERATION OF ALTERNATIVES

- 4.1.1. This Section provides a summary of Volume 1, Chapter 4 (Site Selection and Consideration of Alternatives) which outlines the site selection process undertaken and the alternatives considered for the Proposed Development.

- 4.1.2. The approach taken with regard to site selection and the definition and refinement of the Proposed Development involved the following steps:
- Stage 1: Development of the Sectoral Marine Plan and Scotwind Leasing Round; and
 - Stage 2: Offshore Site Selection.
- 4.1.3. A summary of these stages is presented below, with full details included in Volume 1, Chapter 4 (Site Selection and Consideration of Alternatives).

STAGE 1: DEVELOPMENT OF THE SECTORAL MARINE PLAN AND SCOTWIND LEASING ROUND

- 4.1.4. The SMP for Offshore Wind Energy was published by the Scottish Government in October 2020, which outlines a spatial strategy for commercial scale offshore wind development in Scotland and provides a strategic framework for the ScotWind Leasing Round (Scottish Government, 2020a) through the identification of 15 final Plan Option Areas across four regions (West, North, North East and East) for renewable energy generation.
- 4.1.5. The first ScotWind Leasing Round was launched by Crown Estate Scotland in June 2020. In the ScotWind Leasing Round, developers were able to apply for the rights to build offshore wind farms in Scottish waters within the Plan Option Areas. The final Plan Option Areas were published in October 2020.

STAGE 2: OFFSHORE SITE SELECTION

- 4.1.6. To select a preferred Plan Option area for bidding, the Developer sourced data on physical characteristics and existing infrastructure from in-house models and publicly available sources for Scotland to prioritise the SMP areas with most potential. Once suitable sites were ranked, the Developer identified E2 as the preferred plan area.
- 4.1.7. Key technical parameters assessed to inform the selection of the Array Area (within the E2 Plan Option), included wind resource, bathymetry, ground and metocean conditions, wind turbine sizing, foundation technology options as well as WTG layout flexibility.
- 4.1.8. Analysis conducted by the Developer shows that the proposed Array Area has many desirable features for a floating offshore wind farm, including:
- No visual impact: The Array Area is located approximately 63 km from the shore therefore there will be no visual impacts from the offshore wind farm;
 - Key Conservation Sites: the Array Area is outside any existing European sites and Marine Protected Areas (MPAs). The nearest SPA is 65 km from the site (Buchan Ness to Collieston Coast SPA). The site is adjacent to but avoids the Turbot Bank MPA;
 - Areas for navigation: The proposed site is outside any main shipping routes and is in an area of relatively low vessel density (annual average of 1-250 vessels);
 - Other infrastructure: The site does not overlap with any major oil and gas infrastructure. Hywind is the closest operational wind farm and is 38 km to the west of the site;
 - Commercial fishing: The site has low density fishing activity (MMO annual fishing effort data 2017);

- Fish Spawning: The site is outside any high-density fish spawning areas and is 17 km from the East Coast of Scotland Sandeel Conservation Measure (Marine Scotland); and
 - Archaeology: There are no known wrecks within the site.
- 4.1.9. The Developer collaborated with Xodus and Continuum Industries to utilise an Artificial Intelligence (AI) powered route engine, 'Optioneer', which can simultaneously analyse many qualitative and quantitative factors that impact onshore and offshore cable development to propose optimum route scenarios for route corridors and grid connections. Following confirmation of the grid connection location in Peterhead, the most optimal routes for the four potential landfall locations (Peterhead North, Peterhead South, Sandford Bay and Cruden Bay) were considered in greater detail. The Optioneer process concluded with the offshore ECC which makes landfall at Peterhead North 1, located north of the boundary of the Peterhead Golf Course.

4.2. CONSIDERATION OF ALTERNATIVES

- 4.2.1. Since the submission of the Offshore Scoping Report, several refinements have been made to the design envelope presented in the offshore EIAR. These refinements are summarised below with further details presented in Volume 1, Chapter 3 (Project Description):
- Reduction in the dimensions of all floating foundation options;
 - Removal of two floating foundation options;
 - Reduction in several of the maximum anchor parameters;
 - Removal of the option for a High Voltage Direct Current transmission system;
 - Removal of gravity base OEP foundation option;
 - Removal of subsea OEP(s); and
 - Reduction in maximum offshore export cable length.

5. STAKEHOLDER ENGAGEMENT AND CONSULTATION

5.1. INTRODUCTION

- 5.1.1. This Section presents a summary of Volume 1, Chapter 5 (Consultation) which contains information regarding stakeholder engagement and consultation undertaken by the Developer during the pre-application phase of the Proposed Development.
- 5.1.2. In particular, the stakeholder engagement and consultation EIAR Chapter summarises:
- The policy and legislative context of consultation adhered to during the pre-application phase for the Proposed Development;
 - The stakeholder engagement principles applied to the pre-application phase;
 - A list of stakeholders consulted/approached for feedback; and
 - An overview of the stakeholder engagement undertaken.

5.2. GOOD PRACTICE IN PUBLIC ENGAGEMENT

- 5.2.1. The Developer has sought to engage with stakeholders throughout the pre-application phase, following advice from MD-LOT. The Developer has reviewed and considered all feedback provided as part of stakeholder consultation in the pre-application phase, and this is documented in the relevant Chapters of the EIAR.
- 5.2.2. The Developer is committed to stakeholder engagement at all phases of the Proposed Development, consulting on proposals at key stages throughout the development process. This engagement, including with statutory and non-statutory stakeholders, and the public, has occurred throughout the development of the Proposed Development.

5.3. PUBLIC ENGAGEMENT

- 5.3.1. Key groups of public stakeholders have been engaged throughout the pre-application phase of the Proposed Development, as follows:
- Strategic Engagement: Engagement focused on local and national government bodies including local authority councillors;
 - National Engagement: Engagement focused on statutory stakeholders and non-statutory bodies with particular interest in offshore activity; and
 - Local Engagement: Engagement focused on local organisations, local communities and members of the public.

PRE-APPLICATION CONSULTATION

- 5.3.2. During development of the EIA Report, two informal Public Consultation Events and two formal offshore pre-application consultation events in compliance with the requirements of the Marine (Scotland) Act 2010 and Marine Licensing (Pre-Application Consultation) Scotland Regulations 2013 have been undertaken.
- 5.3.3. The first two informal public consultation events took place in November at Peterhead Football Club and Longside Parish Church, over two days. The first formal pre-application consultation event took place in March 2024, over two days, across two different venues at Peterhead Football Club and Longside Parish Church. The second formal pre-application consultation event took place in September 2024 and was held at Peterhead Football Club.
- 5.3.4. The events allowed members of the public and key stakeholders to view the Proposed Development and provide feedback and comments on the proposals. The event used interactive visual information, such as 3D headsets to inform visitors about key details of the Proposed Development.
- 5.3.5. Questionnaires and physical and online feedback forms were made available to attendees to promote feedback and discussion during and after the events. Further details on these events and the pre-application consultation process followed by the Developer is provided in Volume 4, Appendix 1 (Pre-Application Consultation Report).

PROJECT AWARENESS/SHARING OF INFORMATION

- 5.3.6. The Developer hosts a specific website as a platform for raising awareness of the Proposed Development and for sharing of information and contact details (<https://muirmhor.co.uk/>). The website is actively maintained to provide updates on the Proposed Development, lead team members, community consultation events, virtual exhibition rooms, and supply chain information.

- 5.3.7. Email addresses for general inquiries (info@muirmhor.co.uk), supply chain registration (supplychain@muirmhor.co.uk), and consents enquiries (consents@muirmhor.co.uk) are provided on the website.
- 5.3.8. The website provides a library (<https://muirmhor.co.uk/document-library>), which hosts a digital version of the Offshore Scoping Report for the Proposed Development, and will include the EIA Report, the Report to Inform Appropriate Assessment and other relevant public materials in support of the application.
- 5.3.9. An extensive opt in opt out mailing list also exists for the Project, to further raise awareness of key milestones, project updates and upcoming consultation events.
- 5.3.10. In addition to the consultees engaged by MD-LOT to comment on the Offshore Scoping Report, a list of over 50 organisations were contacted by the Developer for comment on the Scoping Report. This included statutory and environmental bodies, community councils, local authorities, businesses and academic organisations.

STAKEHOLDER ENGAGEMENT MANAGER

- 5.3.11. A dedicated Stakeholder Engagement Manager has promoted and managed consultation with local and regional community stakeholders throughout the development of the EIA Report. The Stakeholder Engagement Manager has worked with local councils, community groups, schools and businesses, talking with them in person, or through remote meetings and written correspondence. Events include:
- School Programs;
 - Science, Technology, Engineering and Mathematics Events;
 - Community Benefit Programs; and
 - Conferences.
- 5.3.12. The Stakeholder Engagement Manager has made themselves freely available to members of the public to discuss, acknowledge feedback and respond to enquiries. Further details of this Stakeholder Engagement Manager consultation are provided in Volume 4, Appendix 1 (Pre-Application Consultation Report).

FISHERIES LIAISON OFFICER

- 5.3.13. The Developer appointed Brown and May Ltd to act as Fisheries Liaison Officer for the Proposed Development. They have been integral to the offshore consultation process, attending the public consultation events alongside the Developer, and supporting in discussions with local fisheries groups to inform an accurate understanding of potential fisheries effects and required mitigation. Further details of this Fisheries Liaison Officer consultation are provided in Volume 4, Appendix 1 (Pre-Application Consultation Report).

5.4. STAKEHOLDER ENGAGEMENT

- 5.4.1. A thorough statutory and non-statutory stakeholder engagement process has been undertaken by the Developer. The Developer aimed to develop a proportionate EIA Report, and the key to achieving this is engagement with stakeholders to incorporate advice, address concerns and develop appropriate mitigation required. This has included meetings, correspondence, meeting minutes and provision of digital documentation.
- 5.4.2. The full list of stakeholders that were approached/consulted during the pre-application process for the Proposed Development can be found in Volume 1, Chapter 5 (Consultation).

5.5. FEEDBACK AND REPORTING

- 5.5.1. The Developer has actively encouraged and sought feedback, involvement and specialist knowledge from all levels of stakeholder during the EIA Report. Feedback received relating to the Proposed Development technical Chapters has been addressed in topic Chapters and appendices.
- 5.5.2. The consultation and feedback process for the Proposed Development is ongoing and will continue post-application, and through all stages of the Proposed Development in compliance with good practice and legislative requirements.

6. ENVIRONMENTAL IMPACT ASSESSMENT METHODOLOGY

- 6.1.1. This Section outlines the EIA methodology used for the assessment of likely significant effects associated with the Proposed Development on physical, biological and human environment receptors. Section 6.1.1 describes the key principles followed during the EIA process and the approach taken as part of this offshore EIAR.
- 6.1.2. This offshore EIAR has been prepared in accordance with the EIA Regulations and relevant policy and legislation as described in Section 2.

6.1. KEY PRINCIPLES OF THE ASSESSMENT

- 6.1.1. The EIA methodology used in this offshore EIAR has been included as a separate Chapter (Volume 1, Chapter 6 (Environmental Impact Assessment Methodology)). In addition, the following is included in each topic Chapter:
- Identification of the study area for the topic specific assessments;
 - Description of topic specific legislation, policy and guidance;
 - Summary of consultation carried out for the Proposed Development;
 - Description of the environmental baseline conditions, including the future baseline;
 - Presentation of the assessment of likely significant effects;
 - Presentation of the Cumulative Effects Assessment;
 - Presentation of the transboundary effects; and
 - Presentation of the inter-related effects.
- 6.1.2. The following sections describe the approach taken as part of the offshore EIA process in more detail.

DESIGN ENVELOPE


- 6.1.3. The design envelope approach has been adopted for the assessment of the Proposed Development, in accordance with current good practice and the "Rochdale Envelope Principle". The design envelope concept allows for a degree of flexibility in design options, particularly for foundations and wind turbine types, where the full details of a project are not necessarily known at the time of application submission.
- 6.1.4. Volume 1, Chapter 3 (Project Description) sets out the design envelope parameters and identifies the range of potential design values for relevant components of the Proposed

Development. For each of the topic Sections within the offshore EIAR and for each of the impacts assessed, the design envelope considers the scenario which would give rise to the greatest potential impact (hereafter referred to as the worst case design scenario).

IDENTIFICATION OF IMPACTS AND SIGNIFICANCE OF EFFECT

- 6.1.5. The Proposed Development has the potential to create a range of impacts and effects with regards to the physical, biological and human environment, for both coastal and marine receptors.
- 6.1.6. For the purposes of the offshore EIAR, the term 'impact' is defined as a change that is caused by an action. For example, the laying of an inter-array cable (action) is likely to result in seabed disturbance (impact). Impacts can be defined as direct, indirect, temporary, irreversible, secondary, cumulative and inter-related. They can also be either positive or negative, although the relationship between them is not always straightforward and relies on available evidence and professional judgement.
- 6.1.7. The term 'effect' is defined as the consequence of an impact. For example, the laying of an inter-array cable (action) results in seabed disturbance (impact), with the potential to disturb benthic habitats and species (effect).
- 6.1.8. The overall significance of an effect is determined through the correlation of the magnitude of impact alongside the sensitivity of the receptor. To ensure consistency in defining the significance of an effect, a matrix approach has been adopted, as presented in Table 6-1.

Table 6-1 Significance of Effect Matrix

 A joint venture between Fred. Olsen Seawind & Vattenfall		Magnitude of Impact			
		Negligible	Low	Medium	High
Sensitivity of Receptor	Negligible	Negligible	Negligible	Negligible	Negligible
	Low	Negligible	Negligible	Minor	Minor
	Medium	Negligible	Minor	Moderate	Moderate
	High	Negligible	Minor	Moderate	Major

- 6.1.9. A level of effect significance of Moderate or Major is considered a 'significant' effect for the purposes of the EIAR. A level of effect of Minor or less is considered 'not significant'.
- 6.1.10. Some topic Chapters in Volume 2 of the EIA Report use alternative EIA methods including specific topic-based guidance/assessments and alternative significance matrices; these are discussed and made clear in the relevant topic Chapters.

MITIGATION

- 6.1.11. If the initial assessment concluded there is potential for a significant effect to occur after the application of embedded commitments, then secondary mitigation measures are proposed.
- 6.1.12. Secondary mitigation is considered to be additional measures implemented to further reduce environmental effects to 'not significant' levels (where appropriate) which could not be avoided by embedded commitments.
- 6.1.13. If additional mitigation measures were found to be required, impacts were re-assessed, and all residual effects clearly stated in the EIAR.

CUMULATIVE EFFECTS ASSESSMENT

- 6.1.14. As well as considering the impacts from the Proposed Development alone, the EIA Regulations require consideration of the potential impacts that could occur cumulatively with other relevant plans, projects, and activities. Cumulative impacts have been assessed by taking into consideration any other plans or projects proposed or existing, (where sufficient information is available) which together with the Proposed Development will have a likely significant effect on a receptor, due to a common impact pathway and/or temporal or spatial overlap.
- 6.1.15. Each technical Chapter of the EIAR provides a Cumulative Effects Assessment (CEA) with regards to their respective receptors.
- 6.1.16. A list of plans, projects and activities that may act cumulatively with the Proposed Development has been identified as part of the EIA Report, see Volume 3, Appendix 6.2 (Offshore Cumulative Effects). For each of these relevant plans, projects or activities, the most up-to-date publicly available project parameters has been used to inform the CEA. Detailed methodology for this assessment is set out within Volume 3, Appendix 6.2 (Offshore Cumulative Effects).
- 6.1.17. A process has been followed for the screening of plans, projects and activities that may be considered in the CEA alongside the Proposed Development, see Volume 3, Appendix 6.2 (Offshore Cumulative Effects). This process involved a screening stage, which identified those foreseeable developments or activities with which the Proposed Development may interact to result in cumulative effects.
- 6.1.18. After the screening, a list of all projects, plans and activities screened in for assessment was produced for each topic and a tiered approach was adopted to complete the CEA. The tiers can be described as:
- **Tier 1** – The whole project (both onshore and offshore elements), combined with plans/projects which have become operational since the baseline characterisation of the Proposed Development, operational projects that have an ongoing impact, plus those that are consented and are yet to be constructed or under construction;
 - **Tier 2** – All plans/projects assessed under Tier 1, plus those projects that have submitted a Scoping Report or those pending determination following a submitted application; and
 - **Tier 3** – All plans/projects assessed under Tier 2, plus those projects that are not currently in the planning system but are likely to enter the planning system soon (e.g., Option for Lease or Agreement for Lease) where information is available to inform the cumulative assessment and there is sufficient data confidence.

- 6.1.19. The tier allocated to each of the projects considered within the topic-specific CEAs is presented in the CEA Sections of each Chapter and further detail on the topic-specific methodologies may be found in the relevant Sections of the EIA Report Chapters.

WHOLE PROJECT ASSESSMENT

- 6.1.20. A separate application for the Project's onshore elements is being made under the Town and Country Planning (Scotland) Act 1997 (noting there is an overlap in the spatial extent of the onshore elements and the Proposed Development within the intertidal area at Landfall). A separate Muir Mhòr onshore EIAR has been prepared, supporting the onshore consent and licence applications.
- 6.1.21. The Proposed Development's infrastructure and activities are the focus of this offshore EIAR. However, where a pathway exists for onshore elements of the Project to impact offshore receptors, this has been identified and assessed in the offshore EIAR.
- 6.1.22. Each topic-specific Chapter has therefore included a 'Whole Project Assessment' Section. The objective is to provide an assessment of any combined effects of the offshore and onshore, elements of the Project. This ensures neither the Proposed Development, nor the onshore Project infrastructure are considered in isolation.

TRANSBOUNDARY EFFECTS

- 6.1.23. Transboundary effects arise when impacts from a development within one European Economic Area (EEA) state's territory significantly affects the environment or interests of another EEA state(s). The EIA Directive, and thus the relevant EIA Regulations, requires the assessment of transboundary effects.
- 6.1.24. If an EIA project is considered to have significant effects on the environment of another EEA state, then the Scottish Ministers must engage with that EEA state to allow consultation if that state wishes to participate.
- 6.1.25. To assist with this process, a screening exercise for potential transboundary impacts has been undertaken and presented in Volume 3, Appendix 6.3 (Offshore Transboundary Effects).
- 6.1.26. This exercise identified that the following receptors may experience transboundary impacts from the Proposed Development:
- Commercial fisheries; and
 - Shipping and navigation.
- 6.1.27. Each of the above topic Chapters provides an assessment of transboundary effects for each receptor group.

INTER-RELATED EFFECTS

- 6.1.28. The EIA Regulations require consideration of the inter-relationships between EIA topics that may lead to environmental effects. Inter-related effects are defined as the interaction between the impacts assessed within different topic assessment Chapters. For example, impacts on fish and shellfish may indirectly impact commercial fisheries.
- 6.1.29. The EIA Report has considered these inter-related effects when they may occur, during all phases of the Proposed Development. This process has considered two levels of potential effect:
- Project lifetime effects: effects that occur throughout more than one phase of the project (construction, operation and maintenance, and decommissioning) interacting to

potentially create a more significant effect upon a receptor than if just assessed in isolation in a single phase; and

- Receptor led effects: effects that interact spatially and/or temporally resulting in inter-related effects upon a single receptor. For example, the effect of subsea noise on marine mammals may be greater when multiple sources of impact interact or combine to produce a different or greater effect upon this receptor than when single sources of impact are considered in isolation. Receptor led effects might be short term, temporary or transient effects, or incorporate longer term effects.
- 6.1.30. Where relevant, inter-relationships with other topic assessment Chapters are identified within each topic impact assessment Chapter.
- 6.1.31. An Ecosystems Effects Assessment was undertaken, see Volume 3, Appendix 6.4 (Ecosystem Level Effects) and concluded the Proposed Development is not likely to result in significant negative ecosystem-level effects, however there are potential positive ecological benefits that could arise. There is potential for offshore wind farms to enhance local biodiversity, support prey species populations (including commercially important species), and contribute to the overall productivity of marine ecosystems. The North Sea is a region that is facing increasing anthropogenic driven pressure in the future which will require well informed and strategic management, to mitigate against ecosystem level impacts. The development of offshore wind farms is part of this increased pressure on the marine environment. However, offshore wind farms can provide positive ecosystem benefits and will help tackle the broader impacts of climate change which will indirectly benefit marine ecosystems.

7. MARINE AND COASTAL PROCESSES

- 7.1.1. Marine and Coastal Processes refers to the following:
- Hydrodynamics, including tidal and non-tidal influences, and waves;
 - Morphology, including bathymetry, geology, surficial sediments and seabed form; and
 - Sediment transport, including bedload, littoral and suspended sediment transport.
- 7.1.2. The characterisation of the baseline environment was achieved through the combined analysis of project specific survey data (including geophysical, benthic and metocean data) in addition to information previously collected to inform the construction and operation of nearby offshore wind farms.
- 7.1.3. The wave climate within the Proposed Development demonstrates strong seasonality, with the larger, less frequent events occurring within the autumn and winter months and the smaller, more frequent events occurring within the spring and summer.
- 7.1.4. Suspended Particulate Matter (SPM) refers to all particles suspended in water, whilst Suspended Sediment Concentration (SSC) specifically measures the mass of sediment particles in the water, which can contribute to the total SPM. Whilst the two are related, there may be a difference depending on local conditions.
- 7.1.5. SPM concentration increases around the autumn, winter and spring months due to an increased occurrence of larger significant wave heights during winter months, which deepen wave bases and intensify erosional processes along the seabed in suitable water depths.
- 7.1.6. Site-specific data indicates an average wave height of 1.89 m and a maximum wave height of 10.5 m between March 2023 and March 2024. The average and maximum readings were 2.9 m and 16.82 m, respectively, noting that the autumn and winter months have the largest wave heights.

- 7.1.7. The Proposed Development is located within a seasonally (summer) stratified (temperature) region. The stratification occurs in water depths between 10 m and 50 m. Stratification typically commences in May, peaks in August and then begins to breakdown, persisting until October. More information can be found in Annex A, Volume 3, Appendix 6.4 (Ecosystem Level Effects).
- 7.1.8. The predominant wave direction in the region is from the south-east, contributing to 30% of total waves recorded, followed by 23% from the north-east, with subsequent significant 17% wave contributors from the north.
- 7.1.9. The tidal range at Peterhead, located approximately 2 km south of landfall is 3.54 m for springs and 1.5 m for neaps.
- 7.1.10. The Array Area is underlain by Eocene and Pliocene sedimentary rocks, overlain by Quaternary deposits between 135 m and 180 m thick. Superficial sands are primarily found in the north-west and a small patch in the north-east of the Array Area. Mixed sediments take up much of the southern, east and west of the Array Area. Muddy sand can be found in the north-east of the array (EGS, 2023a). Bathymetry across the Array Area ranges from 62 m (Lowest Astronomical Tide (LAT)) at the south-west boundary to 97.7 m (LAT) in the north-east corner in the Witching Ground.
- 7.1.11. The landfall area can be characterised as areas of Palaeocene, Permian and Triassic bedrock, followed by a belt of Cretaceous chalk, approximately, 20 km offshore at a depth of 74 m and width of 5 km. Along the offshore ECC, there is a rock outcrop at landfall, followed by coarse shelly sand with intermittent rock outcrops and megaripples (EGS, 2023b). Water depths generally range between approximately 20 m and 97.7 m (LAT) along the offshore ECC, with depths of 100 m to 120 m within the Buchan Deep, located about 25 km east of Peterhead.
- 7.1.12. The regional coastline is primarily characterised by Devonian sedimentary rocks of the Old Red Sandstone Supergroup, with some large masses of Caledonian intrusive rocks. At landfall, large boulders and cobbles covered in green algae are present, along with a matrix of coarse sediment deposits, occasionally revealing underlying bedrock. The intertidal area primarily comprises sand, accounting for 98.7% of the sediment, with minimal gravel or fine fractions (EGS, 2023b). According to Folk (1954) the superficial sediments are either slightly gravelly sand or muddy sand.
- 7.1.13. A number of potential impacts of marine and coastal processes on receptors due to the construction, operation and maintenance, and decommissioning phases of the Proposed Development, were identified. These potential impacts include:
- Increases in SSC and consequential changes to seabed levels and/or morphology;
 - Modifications to littoral transport and coastal behaviour (erosion), including landfall;
 - Seabed scour resulting in bathymetric changes and localised alterations to sediment transport patterns;
 - Modifications to the wave and tidal regime and associated impacts to morphological features; and
 - Modifications to stratification and frontal features.
- 7.1.14. With the embedded commitments in place, all identified impacts result in effects of negligible or minor (adverse) significance, which is not significant in EIA terms.
- 7.1.15. Cumulative impacts arising from the Proposed Development together with other projects and plans were assessed and predicted to result in effects of negligible or minor (adverse) significance (not significant in EIA terms) on the marine and coastal processes receptors. No

additional marine and coastal processes mitigation is considered necessary because the predicted impacts in the absence of mitigation is not significant in EIA terms.

- 7.1.16. No likely significant transboundary effects with regard to marine and coastal processes from the Proposed Development on the interests of other EEA States were predicted.

8. MARINE WATER AND SEDIMENT QUALITY

8.1.1. Marine Water and Sediment Quality refers to:

- Water quality (including surface temperature, salinity, dissolved oxygen and suspended sediment concentration);
- Sediment quality (including sediment type, and sediment contamination); and
- Water Framework Directive Designated Waterbodies and Protected Areas (including coastal and transitional waterbodies, Bathing Waters, Shellfish waters and Nutrient Sensitive Areas).

8.1.2. The characterisation of the baseline environment was achieved through the combined analysis of a desk-based review of relevant spatial and scientific data sources, site-specific survey data (including Particle Size Analysis, sediment contaminants, geophysical and multi-parameter seawater profiling) and sediment plume modelling.

8.1.3. The mean monthly surface water temperatures within the Array Area and offshore ECC ranged from 5.8°C in March to 13.4°C in August. Annual water temperature in the region is coldest in March and warmest in August. Temperature ranged between 9.6°C and 10.01°C across 11 nearshore ECC sampling sites.

8.1.4. Annual average of non-algal SPM data across the study area portray SPM, from the period 1998 to 2015 and shows limited variation within the Array Area and offshore ECC, with values typically less than 6 mg/l throughout an annual period.

8.1.5. Within the EGS survey (2023b) the surficial sediments of the subtidal offshore ECC were collected from 37 subtidal grab samples. The analysed surficial sediments are predominantly sand dominated averaging 84.22%, with a higher gravel percentage present in 40m to 83m water depths. The proportion of fine sediments was low across the subtidal offshore ECC, as was the case with the Array Area averaging 4.53%.

8.1.6. Of the 37 samples from the subtidal offshore ECC Folk classifications were represented predominantly by Gravelly Sand and Sand at 30% and 43% of the classification, respectively. The low proportion of fine sediments across the subtidal offshore ECC indicates a low likelihood of sediment bound contaminants.

8.1.7. Common practice for characterising baseline sediment quality conditions is to compare levels against the Centre for Environment, Fisheries and Aquaculture Science Action Levels (AL) for the Disposal of Dredged Material (as reported by the Marine Management Organisation and Scottish Government (2017)). These Action Levels are used as part of a 'weight of evidence' approach to assessment of material suitable for disposal at sea. Generally, contaminant levels falling below Action Level 1 (AL1) are not of concern and are unlikely to impact the final licensing decision. If contaminant Levels fall above Action Level 2 (AL2), they are generally considered unsuitable for disposal at sea.

8.1.8. Within the offshore ECC, 14 stations assessed the sediment contaminants, seven from the intertidal region and seven from the subtidal aspect of the offshore ECC. Of these, 13 stations recorded concentrations below AL1 for all contaminants with one subtidal station exceeding AL1 for Arsenic. Of note is that the AL2 threshold was not exceeded. These stations are

therefore not of concern and can be characterised as unlikely to impact the final licensing decision. Consequently, the material should be considered safe for disposal at sea.

- 8.1.9. Blue carbon is the term given to carbon sequestered by ocean and coastal ecosystems via biological metabolic processes which is subsequently buried in marine sediments. Particular habitats and species in Scotland are identified as contributing to blue carbon stores and include:
- Nearshore habitats including as kelp and seagrass beds;
 - Calcifying aggregations including maerl and native oysters; and
 - Seabed sediments.
- 8.1.10. A report on carbon budget and blue carbon stores was commissioned by Scottish National Heritage (now NatureScot) in 2014 to define the percentage of carbonate in the top 10 cm of superficial sediments. Within the Array Area, the percentage of carbonate in surficial sediments range from 13% in the north-east to 50% in the south-west of the Array Area seemingly aligning with the changing depths of the seabed. Organic material is considered to be reasonably low across the Proposed Development indicating the blue carbon levels are low in the study area as expected for sand dominated regions.
- 8.1.11. Five potential impacts of marine water and sediment quality on receptors due to the construction, operation and maintenance, and decommissioning phases of the Proposed Development, were identified. These were noted as:
- Deterioration in water quality due to re-suspension of sediments;
 - Release of sediment bound contaminants from disturbed sediments;
 - Deterioration in Bathing Water Quality (parameters relating to nearshore ECC and landfall only);
 - Deterioration in status of Water Framework Directive coastal and/ or transitional waterbodies (parameters relating to nearshore ECC and landfall only);
 - Deterioration in water clarity due to release of drilling fluid.
- 8.1.12. With the embedded commitments in place, all identified impacts result in effects of negligible significance, which is not significant in EIA terms.
- 8.1.13. Cumulative impacts arising from the Proposed Development together with other projects and plans were assessed and predicted to result in effects of negligible significance (not significant in EIA terms) on the marine water and sediment quality receptors. No marine water and sediment quality mitigation is considered necessary because the predicted impacts in the absence of mitigation is not significant in EIA terms.
- 8.1.14. No likely significant transboundary effects with regard to marine water and sediment quality from the Proposed Development on the interests of other EEA States were predicted.

9. BENTHIC SUBTIDAL AND INTERTIDAL ECOLOGY

9.1.1. Benthic, Subtidal and Intertidal Ecology covers:

- Benthic habitats found in the benthic subtidal and intertidal ecology study area;
- Benthic fauna and flora distribution, abundance and diversity in the benthic subtidal and intertidal ecology study area; and
- Sensitive and protected species present in the benthic subtidal and intertidal ecology.

- 9.1.2. Information on the benthic and intertidal communities within the benthic subtidal and intertidal ecology study areas and secondary Zone of Influence was collected through a detailed desktop review of existing literature and data sources.
- 9.1.3. To characterise the features of the seabed, geophysical surveys were undertaken between March-August 2023. Additionally, a subtidal benthic ecology survey was developed based upon a review of the data acquired during the geophysical survey. Subsequently, a survey was undertaken across the Array Area and offshore ECC between July-August 2023 with biological and physicochemical samples collected with a combination of grab sampling and Drop-Down Video.
- 9.1.4. Intertidal surveys were carried out in April 2023 to characterise the intertidal marine habitats. Sampling was a combination of walkover and collection of sediment samples for biological and physicochemical analyses. The comprehensive details of site-specific survey methods and sample analysis are outlined in technical appendix Volume 3, Appendix 9.1 (Offshore Baseline Survey Reports).
- 9.1.5. Bathymetric data from the geophysical survey indicated the topography of the Array Area to be varied with depths ranging between 62 m and 97.7 m. Multiple large boulders with associated scour patterns were sporadically distributed across the Array Area, with a higher concentration of elevated hard contacts observed in the southern Section of the site associated with coarser gravelly sand and sandy gravel habitats.
- 9.1.6. Water depths in the offshore ECC survey range between 20 m at stations closest to the shore to 120 m in the Buchan Deep. To the east of the Buchan Deep depths remain relatively consistent, ranging from 80 to 90 m.
- 9.1.7. The offshore ECC seabed shifts from megarippled sand near the shore to sandy gravel further out, with a transition to predominantly sandy seabed around 22 km offshore. Coarse sediment patches are observed amidst sand, with increased reflectivity indicating coarser substrate around 34 km offshore. Sandwaves are present near the Array Area.
- 9.1.8. Geophysical surveys indicated that boulders had a sporadic distribution across the offshore ECC with a higher concentration of elevated hard contacts observed close to the nearshore end of the offshore ECC associated with gravelly areas of seabed.
- 9.1.9. Surveys indicated a heterogeneous sediment type across the Array Area with sands prevalent in the northern half of the area where the seabed was characterised by megaripples and sand waves with megaripples. Here sediments were classified according to the British Geological Survey modified Folk Sediment Classification (Long, 2006) as predominantly sand or slightly gravelly sand.
- 9.1.10. Analysis indicated that sediments across the offshore ECC survey were predominantly sandy in nature with varying proportions of gravel. Sediments at sites adjacent to the shore were classified as medium sand, although immediately further offshore material became coarser as sandy gravel was recorded.
- 9.1.11. Intertidal sediments were categorised into three Folk classifications (15 stations), with the highest proportion being 'Sand' (87%). The classifications across stations were as follows: 'Sand' (13 stations out of 15 stations), 'Slightly Gravelly Sand' (one station) 'Muddy Sand' (one station).
- 9.1.12. Analysis of sediment bound contaminant data for the Array Area, the offshore ECC and the benthic intertidal ecology study area determined that all concentrations were below AL1 including metals, Polychlorinated biphenyls and Polycyclic Aromatic Hydrocarbons.
- 9.1.13. A total of 10,135 individuals, representing 332 taxa were recorded in the singular replicate grab samples collected at 43 stations during site-specific surveys across the Array Area.

- 9.1.14. Sediment eDNA analyses revealed a wide range of species sequences from the samples. From these data, 23 different phyla were recorded in the 25 samples from sampling stations in the Array Area, with 254 different taxonomic units recovered. The analysis identified one protected species, the horse mussel (*Modiolus modiolus*) which is listed as a Priority Marine Feature but only when it is present as *M. modiolus* beds. No Invasive Non-Native Species were identified.
- 9.1.15. A total of 12,210 individuals, representing 364 taxa were recorded from samples collected from 37 sites sampled across the offshore ECC during site-specific surveys.
- 9.1.16. Sediment eDNA analyses along the offshore ECC revealed a wide range of species sequences from the samples. From these data, 26 different phyla were recorded in the 19 samples, with 253 different taxonomic units recovered. No Invasive Non-Native Species were identified to species level. The family Styelidae was identified and the Invasive Non-Native Species *Styela clava* belongs to this family, however this was not identified to species level.
- 9.1.17. A number potential impacts of benthic, subtidal and intertidal ecology on receptors due to the construction, operation and maintenance, and decommissioning phases of the Proposed Development, were identified. These potential impacts include:
- Increases in SSCs and changes to seabed levels;
 - Direct and indirect seabed disturbance leading to release of sediment contaminants;
 - Permanent and/or long-term habitat loss/alteration due to the addition of infrastructure to the area; and
 - Risk of introductions and/ or spreading of Invasive Non-Native Species, particularly due to presence of infrastructure and vessel movements (e.g., ballast water) which may affect benthic ecology and biodiversity.
- 9.1.18. With the proposed embedded commitments in place, all identified impacts result in effects of negligible or minor (adverse) significance, which is not significant in EIA terms.
- 9.1.19. Cumulative impacts arising from the Proposed Development together with other projects and plans were assessed and predicted to result in effects of minor (adverse) significance (not significant in EIA terms) on the benthic, subtidal and intertidal ecology receptors. No benthic, subtidal and intertidal ecology mitigation is considered necessary because the predicted impacts in the absence of mitigation is not significant in EIA terms.
- 9.1.20. No likely significant transboundary effects with regard to benthic subtidal and intertidal ecology from the Proposed Development on the interests of other EEA States were predicted.

10. FISH AND SHELLFISH ECOLOGY

- 10.1.1. Fish and shellfish ecology refers to the study of fish and shellfish, and how they behave and interact with their environment, such as some species moving between freshwater and marine environments.
- 10.1.2. The environmental baseline was established from relevant literature, desk studies, Project specific studies, numerical modelling studies, and consultation with stakeholders (NatureScot, Dee District Salmon Fishery Board, Fisheries Management Scotland and the Ugie District Salmon Fishery Board). A detailed description of the Fish and Shellfish Ecology baseline is available in Volume 3, Appendix 10.1 (Fish and Shellfish Technical Report).
- 10.1.3. Bottom trawl and beam trawl surveys were undertaken throughout the northern North Sea, from 2019 and 2023 as part of the North Sea International Bottom Trawl Survey and the North Sea Beam Trawl Surveys. The trawl surveys identified assemblages consisting of haddock,

whiting, herring, Norway pout (*Trisopterus esmarkii*), cod, Atlantic mackerel, plaice, anglerfish (*Lophiiformes*) and Raitt's sandeel (*Ammodytes marinus*).

- 10.1.4. Various elasmobranch species are also known to be present in the Moray Firth area. An extensive literature review by Ellis *et al.* (2004) found that elasmobranch populations identified within this region include spurdog (*Squalus acanthias*), lesser spotted dogfish (*Scyliorhinus canicular*), starry ray (*Amblyraja radiata*), cuckoo ray, thornback ray and spotted ray (*Raja montagui*).
- 10.1.5. In the Array Area, eDNA surveys indicated the presence of various fish species, including Atlantic herring, whiting, European hake, Atlantic mackerel, and cuckoo skate/ray. Notably, the Atlantic herring, whiting, and European hake are designated as UK Biodiversity Action Plan Species, listed on the Scottish Biodiversity List, and recognized as PMF in Scotland (EGS, 2023a). The Array Area also supports species like long-nosed skate (*Beringraja rhina*) and porbeagle (*Lamna nasus*), with the former being 'Near Threatened' on the International Union for the Conservation of Nature (IUCN) Red List and the latter being a Species of Conservation Interest and 'Vulnerable' according to the IUCN Red List.
- 10.1.6. In the offshore ECC, surveys recorded the presence of Atlantic herring, whiting, European hake, brown trout, Atlantic mackerel, and three-spined stickleback. Among these species, Atlantic herring, whiting, European hake are UK Biodiversity Action Plan Species, listed on the Scottish Biodiversity List, and identified as PMFs in Scotland. Additionally, brown trout is listed on the Scottish Biodiversity List and recognized as a PMF in Scotland (EGS, 2023b). The offshore ECC area also supports species like Norway pout (*Trisopterus esmarkii*), which is a PMF in Scotland. Furthermore, the area is home to species like cuckoo skate/ray and classified as 'Least concern' on the IUCN Red List.
- 10.1.7. Several species of fish and shellfish are known to either spawn or have nursery areas in relatively close proximity to, or potentially overlapping with the study area, of key relevance are herring and sandeel due to their demersal spawning nature and therefore increased sensitivity to potential impacts from the Proposed Development.
- 10.1.8. The Array Area and offshore ECC lie within the Buchan herring stock spawning ground that runs along the east coast of Scotland and extends offshore. Analysis of the particle size distribution was detailed in Volume 3, Appendix 10.1 (Fish and Shellfish Technical Report) within the Array Area deemed the majority of the area to be 'Unsuitable' for herring spawning, suggesting a very low likelihood of spawning. However, some discrete areas in the southern part of the Array Area have been classified as either 'Marginal' or 'Preferred'.
- 10.1.9. The Proposed Development overlaps with high intensity sandeel spawning grounds, while low intensity spawning grounds are present to the north and south of the Proposed Development. In the offshore ECC, the majority is classified as "Preferred" habitats for sandeel, with a 50% probability of finding buried sandeel around 3 km from shore and an estimated density of 30 to 60 individuals per square meter.
- 10.1.10. Migratory fish species that have the potential to occur traverse the study area and exist in the nearby rivers and estuaries include Atlantic salmon, sea trout, European eel, smelt (*Osmerus eperlanus*), twaite shad (*Alosa fallax*), allis shad (*Alosa alosa*), river lamprey and sea lamprey.
- 10.1.11. There are low intensity nursery grounds for common skate, spotted ray, spurdog and tope shark that interact with the study area. The site-specific eDNA surveys detected porbeagle and starry smoothhound in the offshore ECC but not in the Array Area.
- 10.1.12. A number of potential impacts of fish and shellfish ecology on receptors due to the construction, operation and maintenance, and decommissioning phases of the Proposed Development, were identified. These potential impacts include:
- Direct and indirect seabed disturbance leading to release of sediment contaminants;

- Direct damage (e.g., crushing) and disturbance to mobile demersal and pelagic fish and shellfish species;
 - Mortality, injury, behavioural impacts, and auditory masking arising from underwater noise and vibration;
 - Permanent and/or long-term habitat loss/alteration due to the addition of infrastructure to the area; and
 - Ghost fishing due to lost fishing gear becoming entangled in installed infrastructure.
- 10.1.13. With the embedded commitments in place, most of these impacts result in effects of negligible or minor (adverse) significance, which is not significant in EIA terms, with key exceptions where secondary mitigation was deemed necessary.
- 10.1.14. Secondary mitigation was deemed necessary for two potential impacts on demersal spawning herring: increases in suspended sediment concentrations and deposition of disturbed sediments to the seabed, and mortality, injury, behavioural impacts, and auditory masking arising from noise and vibration.
- 10.1.15. Additional fish and shellfish ecology mitigation is considered to be necessary due to the potential for significant effects on spawning herring in the absence of further mitigation (beyond the embedded commitments).
- 10.1.16. Mitigation options are presented within the In Principle Fish Mitigation Plan that shows how these significant effects of increased suspended sediment concentrations and deposition to the seabed during herring spawning and potential mortality, injury, behavioural impacts, and auditory masking arising from noise and vibration can be reduced to levels that are not significant.
- 10.1.17. No additional fish and shellfish ecology mitigation is considered necessary for all other receptors, because the likely effect in the absence of further mitigation (beyond the embedded commitments) is not significant in EIA terms.
- 10.1.18. Cumulative impacts arising from the Proposed Development together with other projects and plans were assessed and predicted to result in effects of minor (adverse) significance (not significant in EIA terms) on the fish and shellfish ecology receptors with one key exception of cumulative mortality, injury, behavioural impacts, and auditory masking arising from noise and vibration. No additional monitoring is required for cumulative effects as the likely effects after inclusion of mitigation as outlined in the In Principle Fish Mitigation Plan and those included as embedded commitments are expected to reduce effects to levels that are not significant in EIA terms.
- 10.1.19. No likely significant transboundary effects with regard to fish and shellfish ecology from the Proposed Development on the interests of other EEA States were predicted.

11. OFFSHORE AND INTERTIDAL ORNITHOLOGY

- 11.1.1. Offshore ornithological receptors are those that naturally occur at sea and may have the potential to be affected by offshore renewable energy developments. This includes those species classed as 'seabirds', plus migratory species such as geese and swans as well as waders, raptors, and passerines.
- 11.1.2. Intertidal ornithology typically relates to coastal species that occur between MLWS and MHWS, such as waders, wildfowl, and other waterbirds. Offshore ornithology refers to the birds that may interact with the Proposed Development. This includes seabirds (birds that spend a lot of their time at sea) and also other birds that may pass through or near the array on migration.

- 11.1.3. The birds likely to interact with the Proposed Development were characterised by both a desk-based review of available information, landfall surveys to collect data on intertidal birds, and site-specific surveys that were undertaken by using digital cameras on aircraft flying over the site to capture videos. Birds were counted and identified from the videos.
- 11.1.4. Key species found from the data and considered within the assessment were:
- Kittiwake;
 - Herring gull;
 - Lesser black-backed gull;
 - Sandwich tern;
 - Little tern;
 - Common tern;
 - Arctic tern;
 - Great skua;
 - Guillemot;
 - Razorbill;
 - Puffin;
 - European storm petrel;
 - Leach's storm petrel;
 - Manx shearwater;
 - Fulmar; and
 - Gannet.
- 11.1.5. A number of potential impacts on offshore and intertidal ornithological receptors due to the construction, operation and maintenance, and decommissioning phases of the Proposed Development, were identified. These potential impacts include:
- Direct distributional responses (behavioural responses such as avoidance);
 - Indirect distributional responses (re-distribution due to prey species availability);
 - Collision with rotating blades of operational WTGs;
 - Entanglement in marine debris (i.e. fishing gear); and
 - Artificial lighting.
- 11.1.6. With the embedded commitments in place, all identified impacts result in effects of negligible significance, which is not significant in EIA terms.
- 11.1.7. Cumulative impacts arising from the Proposed Development together with other projects and plans were assessed and predicted to result in effects of negligible or minor (adverse) significance (not significant in EIA terms) on the ornithological receptors. No ornithological mitigation is considered necessary because the predicted impacts in the absence of mitigation is not significant in EIA terms.
- 11.1.8. No likely significant transboundary effects with regard to offshore and intertidal ornithology from the Proposed Development on the interests of other EEA States were predicted.

12. MARINE MAMMALS

- 12.1.1. The marine mammal assessment focuses on the marine mammal communities within the vicinity of the Proposed Development. The northern North Sea is an important area for marine mammals, supporting many species of cetaceans (dolphins, whales and porpoises) and two species of seal. The distribution of marine mammals is strongly influenced by the distribution of their prey (i.e. mostly fish) and their occurrence is often unpredictable due to their highly mobile nature.
- 12.1.2. The key species informing the assessment were:
- Harbour porpoise (*Phocoena phocoena*);
 - Bottlenose dolphin (*Tursiops truncatus*);
 - White-beaked dolphin (*Lagenorhynchus albirostris*);
 - Risso's dolphin (*Grampus griseus*);
 - Minke whale (*Balaenoptera acutorostrata*);
 - Harbour seal (*Phoca vitulina*); and
 - Grey seal (*Halichoerus grypus*).
- 12.1.3. The environmental baseline was established using desk studies, site-specific surveys, monthly digital video aerial surveys, marine mammal observer reports and passive acoustic monitoring. A detailed description of the Marine Mammals baseline is available in Volume 3, Appendix 12.1 (Marine Mammal Baseline Technical Report).
- 12.1.4. The Array Area is not located within any marine mammal protected areas, but the offshore ECC overlaps with the Southern Trench Nature Conservation Marine Protected Area designated for minke whale.
- 12.1.5. Of the cetaceans, harbour porpoise was the most frequently recorded species and, during site-specific aerial surveys, was sighted in every month of the year. Minke whale and white beaked dolphin were found to be seasonal visitors to the region (summer months), whilst bottlenose dolphins, which primarily move along inshore areas, are part of an east coast of Scotland resident population. Grey seals and harbour seals haul out on shore in coastal areas and make foraging trips out to sea. Seals were recorded regularly during site-specific aerial surveys, with most species identified as grey seal.
- 12.1.6. Several potential impacts on marine mammals receptors due to the construction, operation and maintenance, and decommissioning phases of the Proposed Development, were identified. These potential impacts include:
- Auditory injury and/or disturbance from geophysical surveys, UXO clearance, piling, and other pre-construction and construction activities;
 - Indirect impacts on prey availability and distribution;
 - Operational noise impacts and risk of collision from floating WTGs;
 - Risk of injury from entanglement – primary, secondary and tertiary entanglement; and
 - Long-term habitat changes, displacement and/or barrier effects due to the presence of WTGs.
- 12.1.7. Throughout the construction, O&M and decommissioning phases, all impacts assessed were found to have either negligible, or minor effects on marine mammal receptors within the Proposed Development (i.e., not significant in EIA terms).

- 12.1.8. The assessment of cumulative impacts from the Proposed Development and other developments and activities, including OWFs, concluded that the effects of any cumulative impacts would be of negligible to minor significance (also not significant in EIA terms).
- 12.1.9. No likely significant transboundary effects with regard to marine mammals from the Proposed Development on the interests of other EEA States were predicted.

13. COMMERCIAL FISHERIES

- 13.1.1. Commercial fisheries refers to any form of fishing activity legally undertaken and sold for taxable profit. The commercial fisheries active across the Proposed Development and wider regional area were characterised via a desktop study and consultation with the industry.
- 13.1.2. The commercial fishing fleets operating across the local study area and wider regional study area include:
- UK demersal otter trawlers targeting haddock and mixed demersal species;
 - UK demersal seine targeting haddock and mixed demersal species;
 - UK and non-UK (including Norwegian, French, Danish, Dutch and German) pelagic trawlers and purse seine targeting herring;
 - UK scallop dredgers targeting king scallop;
 - UK potting vessels targeting brown crab, lobster and velvet; and
 - UK vessels deploying hook and lines targeting mackerel.
- 13.1.3. On average, £13.9 million in first sales value is landed from the commercial fisheries local study area, based on 5 years from 2018-2022. The average annual value landed from the commercial fisheries regional study area is £52.3 million.
- 13.1.4. The key species landed from the commercial fisheries local study area are Norway Lobster (*Nephrops norvegicus*), haddock (*Melanogrammus aeglefinus*), herring (*Clupea harengus*), brown crab (*Cancer pagurus*), king scallop (*Pectan maximus*), monkfish (*Lophius* species), whiting (*Merlangius merlangus*) and lobster (*Homarus gammarus*).
- 13.1.5. The demersal otter trawl/seine fisheries account for £8.6 million first sales value landed annually from the local study area, which accounts for 62% of the landed value.
- 13.1.6. Several potential impacts on commercial fisheries receptors due to the construction, operation and maintenance, and decommissioning phases of the Proposed Development, were identified. These potential impacts include:
- Reduction in access to, or exclusion from established fishing grounds within the Array Area or the ECC;
 - Displacement leading to gear conflict and increased fishing pressure on adjacent grounds;
 - Disturbance of commercially important fish and shellfish resources leading to displacement or disruption of fishing activity;
 - Increased vessel traffic associated with the Proposed Development within fishing grounds leading to interference with fishing activity;
 - Additional steaming to alternative fishing grounds for vessels that would otherwise fish within the Proposed Development; and
 - Increased snagging risk, which could result in loss or damage to fishing gear.

- 13.1.7. With the embedded commitments in place, many of these impacts result in effects of negligible or minor (adverse) significance, which is not significant in EIA terms, with key exceptions where secondary mitigation was deemed necessary.
- 13.1.8. Additional commercial fisheries mitigation is considered to be necessary due to the potential for significant effects on receptors in the absence of further mitigation (beyond the embedded commitments). This relates to the following four potential impacts:
- Reduction in access to, or exclusion from established fishing grounds within the Array Area or the ECC (for all fishing fleets except non-UK pelagic otter trawl and purse sein and UK gear with hooks);
 - Displacement leading to gear conflict and increased fishing pressure on adjacent grounds (for UK demersal otter trawl, demersal seine, scallop dredge and potting);
 - Disturbance of commercially important fish and shellfish resources leading to displacement or disruption of fishing activity (for UK and Non-UK pelagic otter trawl and purse seine); and
 - Additional steaming to alternative fishing grounds for vessels that would otherwise fish within the Proposed Development (for UK demersal otter trawl).
- 13.1.9. Mitigation options are presented within the Outline Fisheries Management and Mitigation Strategy and In Principle Fish Mitigation Plan which allow the significant effects during the construction phase to be reduced to minor (adverse) which is not significant in EIA terms.
- 13.1.10. The residual effect during the operational phase is reduced to moderate adverse significance for the UK demersal otter trawl and UK pelagic otter trawl/purse seine fleets, and therefore is significant in EIA terms; and minor adverse significance or negligible for all other fleets, which is not significant in EIA terms.
- 13.1.11. The Developer is committed to a Fisheries Fund during the first five years of the operational phase. This is not intended to compensate individual fishing businesses, but to provide funding to support the overall fisheries where significant effects have been identified i.e., the haddock, scallop and herring fisheries. The administrative functionality of the Fisheries Fund will be determined in consultation with the fishing industry and defined in the Final Fisheries Management and Mitigation Strategy.
- 13.1.12. Following application determination, further work will explore the potential opportunity for this Fisheries Fund to be jointly delivered at a strategic regional level.
- 13.1.13. Cumulative impacts arising from the Proposed Development together with other projects and plans were assessed and predicted to result in effects minor (adverse) significance (not significant in EIA terms) on commercial fisheries receptors. No commercial fisheries mitigation is considered necessary because the predicted impacts in the absence of mitigation is not significant in EIA terms.
- 13.1.14. No likely significant transboundary effects with regard to commercial fisheries from the Proposed Development on the interests of other EEA States were predicted.

14. SHIPPING AND NAVIGATION

- 14.1.1. Shipping and navigation refers to the regular activity and behaviour of surface based vessels.
- 14.1.2. Baseline data to inform the shipping and navigation assessment was collected using vessel traffic surveys (via Automatic Identification System, radar and visual observation); collision and allision risk modelling; and a desktop study.

- 14.1.3. For the 14 days analysed in the winter survey period, there was an average of 12 unique vessels per day recorded within the Shipping and Navigation study area, and three unique vessels every day recorded intersecting the Array Area itself. For the 14 days analysed in the summer survey period, there was an average of 18 unique vessels per day recorded within the Shipping and Navigation study area, and again three unique vessels every day recorded intersecting the Array Area itself. The main vessel types recorded within the Shipping and Navigation study area overall were oil and gas vessels (58%), cargo vessels (17%), and fishing vessels (15%). Both recreational vessels and passenger vessels were seasonal and only recorded during the summer survey period.
- 14.1.4. A total of 18 main commercial routes were identified within the Shipping and Navigation study area (as defined by the principles set out in Marine Guidance Note 654).
- 14.1.5. For the 17 days analysed in the winter data period, there was an average of 48 unique vessels per day recorded within the Shipping and Navigation offshore ECC study area, and 39 unique vessels every day recorded crossing the offshore ECC itself. For the 14 days analysed in the summer data period, there was an average of 62 unique vessels per day recorded within the Shipping and Navigation offshore ECC study area, and 45 unique vessels every day recorded crossing the offshore ECC itself. The main vessel types recorded within the Shipping and Navigation offshore ECC study area overall were oil and gas vessels (36%), fishing vessels (31%), and cargo vessels (13%).
- 14.1.6. No vessels were deemed to be at anchor within the Shipping and Navigation Array Area or offshore ECC study areas.
- 14.1.7. The Search and Rescue helicopter service is currently operated by Bristow Group and the closest operational base to the Proposed Development is Inverness at 108 nm (200 km) to the west.
- 14.1.8. A total of 10 helicopter taskings were recorded within the combined Shipping and Navigation study areas between April 2015 and March 2023, equating to an average of one tasking per year. Only two taskings occurred within the Shipping and Navigation study area; a “rescue/recovery” and a “support”, no taskings were recorded within the Array Area itself.
- 14.1.9. A total of 46 incidents were responded to by the Royal National Lifeboat Institution within the combined Shipping and Navigation study area between 2013 and 2022. This corresponds to an average of approximately four to five incidents per year; however, it is noted that the majority of incidents (approximately 85%) occurred within 5 nm (9.26 km) of the coast whilst the number of incidents further offshore was much lower.
- 14.1.10. A total of 28 unique incidents were reported to the Marine Accident Investigation Branch within the combined Shipping and Navigation study areas between 2012 and 2021. This corresponds to an average of three incidents per year; however, it is noted that the majority of incidents (approximately 71%) occurred within 6 nm (11.1 km) of the coast whilst the number of incidents further offshore was much lower. Only one incident occurred with the Array Area, a near miss collision incident in 2016 involving a dry cargo vessel and a platform under tow but no contact occurred. The most common incident types recorded were “accident to person” (32%) and “machinery failure” (30%). The most common casualty type recorded was fishing vessels (59%).
- 14.1.11. A number of potential impacts on shipping and navigation receptors due to the construction, operation and maintenance, and decommissioning phases of the Proposed Development, were identified. These potential impacts include:
- Vessel displacement, reduction of under keel clearance as a result of cable protection, dynamic cables, and mooring lines;
 - Increased vessel collision and allision risk;

- Reduced access to local port, harbours, and marinas; and/or loss of station; and
 - Reduction of emergency response capability including Search and Rescue.
- 14.1.12. Assessment of effects on shipping and navigation receptors was based on the Formal Safety Assessment methodology noting this is the international standard for marine assessment, and is the approach required by the Maritime and Coastguard Agency under Marine Guidance Note 654. This approach differs to the general approach outlined in Volume 1, Chapter 6 (EIA Methodology) of the EIAR.
- 14.1.13. For the purposes of the Shipping and Navigation assessment, a level of effect determined as being of unacceptable significance are considered a 'significant' effect for the purposes of the EIA. Effects determined to be tolerable with mitigation or broadly acceptable are not significant and are As Low As Reasonably Practicable.
- 14.1.14. With the proposed embedded commitments in place, all identified impacts result in effects of tolerable with mitigation or broadly acceptable significance, which is not significant in EIA terms.
- 14.1.15. Cumulative impacts arising from the Proposed Development together with other projects and plans were assessed and predicted to result in effects of tolerable with mitigation or broadly acceptable significance (not significant in EIA terms) on shipping and navigation receptors. No shipping and navigation mitigation is considered necessary because the predicted impacts in the absence of mitigation is not significant in EIA terms.
- 14.1.16. No likely significant transboundary effects with regard to shipping and navigation from the Proposed Development on the interests of other EEA States were predicted.

15. MARINE ARCHAEOLOGY AND CULTURAL HERITAGE

- 15.1.1. The marine archaeology and cultural heritage assessment evaluated the likely significant effects of the offshore Project on marine historic environment assets (e.g. shipwrecks and aviation crash sites) up to MHWS.
- 15.1.2. Baseline data to inform the Marine Archaeology and Cultural Heritage assessment was collected through a desktop study and site-specific surveys. The geophysical survey scope included the acquisition of Multibeam, sidescan sonar, magnetometer and sub-bottom profiler data acquired by EGS between April and August 2023. An archaeological assessment of geophysical survey data was undertaken to enhance the baseline characterisation for Marine Archaeology and Cultural Heritage.
- 15.1.3. There are currently no known submerged prehistoric sites within the study area. Based on the available data the offshore ECC palaeogeographic assessment was undertaken between -20 m and -50 m contours, approximately between 1.5 and 6.5 km offshore. The archaeological assessment of sub-bottom profiler data identified no distinct palaeogeographic features of archaeological potential from within the area of the offshore ECC.
- 15.1.4. The area assessed was interpreted to be covered by a veneer of modern seabed sediment, which in itself is not considered to be of archaeological potential, however, has the potential to cover sites (e.g. wreck remains) where it attains sufficient thickness.
- 15.1.5. The Array Area is situated in water depths of approximately between 60 m and 90 m. As such, no palaeolandscape assessment has been undertaken within this area as the potential is judged to be too low.

- 15.1.6. There are currently no maritime or aviation sites within the study area that are subject to statutory protection from the Protection of Wrecks Act 1973: Section 2, the Protection of Military Remains Act 1986, or the Ancient Monuments and Archaeological Areas Act 1979.
- 15.1.7. A total of 563 features were identified as being of possible archaeological potential within the study area. Full details can be found in Volume 2, Chapter 15 (Marine Archaeology and Cultural Heritage) illustrated in Figures 4-6 of Volume 3, Appendix 15.1 (Marine Archaeology and Cultural Heritage Technical Report).
- 15.1.8. Recorded Losses can be considered as an indication of the potential for archaeological maritime remains to exist within the study area and the type and number of wrecks that could be present. These records relate to vessels reportedly lost for which no physical wreck remains have ever been identified. A total of 91 recorded losses are reported for the study area.
- 15.1.9. There are no known aircraft crash sites recorded within the study area.
- 15.1.10. There are three known archaeological sites located within the intertidal zone, up to MHWS, relating to Second World War defense infrastructure. These consist of pillboxes and anti-tank blocks along Craigewan Beach.
- 15.1.11. Four potential impacts on shipping and navigation receptors due to the construction, operation and maintenance, and decommissioning phases of the Proposed Development were identified. These were noted as:
- Loss or damage to known and unknown marine historic environment from direct impacts;
 - Loss or damage to submerged prehistoric landscapes from direct impacts;
 - Indirect disturbance to marine historic environment assets caused by cable burial methods and/or cable protection; and
 - Indirect disturbance to marine historic environment assets caused by additional cable protection used during repair and maintenance.
- 15.1.12. With the embedded commitments in place, all identified impacts result in effects of negligible or minor (adverse) significance, which is not significant in EIA terms.
- 15.1.13. Cumulative impacts arising from the Proposed Development together with other projects and plans were assessed and predicted to result in effects of negligible significance (not significant in EIA terms) on the marine archaeology and cultural heritage receptors and therefore no additional mitigation is considered necessary because the predicted impacts in the absence of mitigation is not significant in EIA terms.
- 15.1.14. No likely significant transboundary effects with regard to marine archaeology and cultural heritage from the Proposed Development on the interests of other EEA States were predicted.

16. MILITARY AND CIVIL AVIATION

- 16.1.1. Military and Civil aviation refers to the stakeholders/receptors that operate in the airspace, interacting with each other, the air traffic management provided and the relationship/effects of the physical environment.
- 16.1.2. For the purposes of the Military and Civil Aviation assessment, a desk-based review was undertaken using relevant data sources. The primary sources of aviation related data used for the desktop study are the UK civil and military Aeronautical Information Publications.

- 16.1.3. The airspace above and adjacent to the Array Area is used by civil and military aircraft and lies within the Scottish Flight Information Region for Air Traffic Control. This airspace is regulated by the UK Civil Aviation Authority. NERL provides en-route civil air traffic services within the Scottish Flight Information Region and operates a network of radar facilities providing en-route information for Air Traffic Control on both civil and military aircraft.
- 16.1.4. Aircraft operate under one of two flight rules: Visual Flight Rules or Instrument Flight Rules. From sea level to Flight Level (FL) 195, approximately 19,500 ft or 5,950 m Above Mean Sea Level, the airspace in the vicinity of the Array Area is Class G uncontrolled airspace. This airspace is used predominantly by low level flight operations and generally by aircraft flying under Visual Flight Rules.
- 16.1.5. The nearest major UK civil airport to the Array Area is Aberdeen Airport, which is approximately 93.5 km to the west-south-west.
- 16.1.6. The closest NERL radars to the Array Area are based at Allanshill, 88 km to the west-north-west, and Perwinnes, 89 km to the west-south-west. NERL radar facilities are combined PSR and Secondary Surveillance Radar systems. Perwinnes radar is also the Air Traffic Control radar for Aberdeen Airport.
- 16.1.7. The Array Area lies beneath the Central Complex Danger Area, one of four such complexes in UK airspace that, when activated, provide segregated airspace for military flying training. Specifically, the Array Area is beneath Danger Area EG D613A which has vertical limits from FL 100, approximately 10,000 ft above mean sea level, to FL 660. Ordnance, munitions and explosives and high energy maneuver activities take place within this Danger Area.
- 16.1.8. The closest PSR-equipped military airfield is Royal Air Force Lossiemouth, 159 km west-north-west of the Array Area, which is beyond the study area limits. The nearest MOD Air Defence radar to the Array Area is based at Remote Radar Head (RRH) Buchan, 66 km to the west
- 16.1.9. The Array Area is within the Aberdeen Offshore Safety Area airspace extending from the surface to FL 100 (approximately 10,000 ft above mean sea level). The Offshore Safety Area is the busiest airspace in the vicinity in terms of offshore helicopter traffic and contains a network of offshore routes over the North Sea that are flown by helicopters in support of oil and gas installations.
- 16.1.10. There are ten helicopter Search and Rescue bases around the UK with Bristow Helicopters providing helicopters and aircrew. The nearest base is at Inverness Airport, 200 km west of the Array Area.
- 16.1.11. The closest Met Office weather radar to the Array Area is located at Hill of Dudwick in Aberdeenshire, 79 km west of the Array Area.
- 16.1.12. Three potential impacts on military and civil aviation receptors due to the construction, operation and maintenance, and decommissioning phases of the Proposed Development, were identified. These were noted as:
- Creation of an aviation obstacle environment;
 - Increased air traffic in the area related to wind farm activities;
 - Impact on NERL Allanshill PSR, NERL Perwinnes PSR and Buchan AD PSR.
- 16.1.13. With the embedded commitments in place, the following impacts result in effects of minor (adverse) significance, which is not significant in EIA terms:
- Creation of an aviation obstacle environment; and
 - Increased air traffic in the area related to wind farm activities.

- 16.1.14. With the embedded commitments in place, the following impacts result in effects of major (adverse) significance, which is significant in EIA terms:
- Impact on NERL Allanshill PSR, NERL Perwinnes PSR and Buchan Air Defence PSR.
- 16.1.15. Once secondary mitigation solutions are implemented in consultation with the Ministry of Defence and NATS, the magnitude of the impact is deemed to be negligible, and the sensitivity of the receptor is high. The effect will, therefore, be of negligible significance, which is not significant in EIA terms.
- 16.1.16. Cumulative impacts arising from the Proposed Development together with other projects and plans were assessed and predicted to result in effects of minor (adverse) significance (not significant in EIA terms) on the following military and civil aviation receptors and therefore no additional mitigation is considered necessary because the predicted impacts in the absence of mitigation is not significant in EIA terms:
- Creation of an aviation obstacle environment; and
 - Increased air traffic in the area related to wind farm activities.
- 16.1.17. It is assumed that for existing offshore wind developments within radar line of sight of NATS and the Ministry of Defence radars any required radar mitigation solutions have been implemented. Future operational offshore wind developments, including the Proposed Development, must have any necessary radar mitigation solutions in place before becoming operational. With mitigation solutions implemented, the magnitude of the impact is deemed to be negligible, and the sensitivity of the receptor is high. The residual cumulative effect will, therefore, be of negligible significance, which is not significant in EIA terms.
- 16.1.18. The following cumulative impact was assessed and predicted to result in effects of major (adverse) significance (significant in EIA terms) on the military and civil aviation receptors and therefore additional mitigation is considered necessary to reduce the magnitude to non-significant in EIA terms:
- Impact on NERL Allanshill PSR, NERL Perwinnes PSR and Buchan Air Defence PSR.
- 16.1.19. Once secondary mitigation solutions are implemented in consultation with the Ministry of Defence and NATS, the magnitude of the impact is deemed to be negligible, and the sensitivity of the receptor is high. The effect will, therefore, be of negligible significance, which is not significant in EIA terms.
- 16.1.20. No likely significant transboundary effects with regard to military and civil aviation from the Proposed Development on the interests of other EEA States were predicted.

17. SOCIO-ECONOMICS TOURISM AND RECREATION

- 17.1.1. The offshore socio-economics assessment of effects considers the local economies, populations, tourism and recreation activities which are located in the areas that might be affected by the Proposed Development. This includes the areas closest to offshore activities as well as other important locations that may be used to support the construction, operation and maintenance, and decommissioning activities related to the offshore elements of the Proposed Development (e.g. laying cables offshore, installing the wind turbines etc). These are primarily port and harbour facilities on the east coast of Scotland. The assessment also considers how the Proposed Development might affect Scotland as a whole.

17.1.2. The main local epicentres of impact are expected to be the ports used during the construction and O&M for the Proposed Development. However, at this stage these ports are not known, and therefore the following socio-economic study areas were considered:

- Construction port, i.e. the area around the construction port (construction phase only);
- O&M port, i.e. the area around the O&M port (O&M phase only);
- Scotland; and
- The UK.

17.1.3. While ports are not known, a list of potential ports for the construction and O&M phases were considered to identify the maximum design scenario and are presented in Table 17-1 below.

17.1.4. For those ports in rural areas, the electoral ward in which the port was based was used to define the study areas, and for those in urban areas, the wider local authority was used. While it is acknowledged that the impacts from portside activities will be felt across a wider area than these geographies, the most likely significant effects will be those felt in the immediate area.

Table 17-1 Potential Construction and O&M Ports

Ports	Local Study Area (Local Authorities)
Construction	
Port of Aberdeen	Aberdeen City, Aberdeenshire
Ardersier	Highland, Moray
Burntisland	Fife, City of Edinburgh, West Lothian
Port of Cromarty Firth	Highland
Port of Dundee	Dundee, Angus, Fife
Port of Leith	City of Edinburgh, Midlothian, West Lothian, East Lothian
Port of Nigg	Highland
Orkney – Scapa Deep Water Quay	Orkney Islands
Peterhead	Aberdeenshire
O&M	
Port of Aberdeen	Aberdeen City, Aberdeenshire
Fraserburgh	Aberdeenshire
Port of Nigg	Highland
Montrose	Angus, Aberdeenshire, Dundee City
Peterhead	Aberdeenshire

17.1.5. For the purposes of the socioeconomics, tourism and recreation Chapter, a desk-based review was undertaken using relevant spatial and economic data sources. This study was aimed at evaluating and assessing the key datasets and statistics related to socio-economics features and supply chain capabilities in the UK and Scotland.

17.1.6. Sectors relevant to the construction phase of the Proposed Development include manufacturing, which has total employment in Scotland of 171,000 (7.3% of Great Britain's manufacturing employment) and construction (142,000, 9.4% of total construction employment in Great Britain). Scotland's high share employment in mining and quarrying sectors, which employ 25,000 people (accounting for 53.2% of Great Britain's mining and quarrying employment), reflects strengths in offshore oil and gas, which are relevant for the development and construction phases. Scottish employment in transportation and storage of 101,000 (6.5% of UK employment), will also be relevant since the Proposed Development will require port infrastructure during the construction, operation, and maintenance phases.

- 17.1.7. Baseline data (population, employment and employment in the construction sector) for the local study areas of the long-listed construction port locations shows that the port associated with the lowest population and construction employment is located in Orkney, while the largest population and construction employment is associated with Burntisland, which includes Fife, the City of Edinburgh and West Lothian.
- 17.1.8. Baseline data (population, employment and employment in the construction sector) for the local study areas of the long-listed O&M port locations shows that the port associated with the lowest population is Nigg (study area of Highland) while the ports with the lowest construction employment are located in Aberdeenshire. The port with the largest population and construction employment is Montrose.
- 17.1.9. The latest figures show that there were around 6.1 million domestic visitors to Aberdeenshire, with a total expenditure of around £212.6 million. This represented around 3.9% of domestic visitor numbers in Scotland and 2.6% of domestic visitor spending.
- 17.1.10. Nine potential impacts on socioeconomics, tourism and recreation receptors due to the construction, operation and maintenance, and decommissioning phases of the Proposed Development, were identified. These included:
- Increase in employment and Gross Value Added
 - Changes to demographics, housing demand, local public and private services;
 - Changes to visitor behaviour;
 - Changes to commercial fisheries, shipping and marine recreation; and
 - Increased renewable electricity.
- 17.1.11. With the embedded commitments in place, all identified impacts result in effects of negligible or moderate (beneficial) significance, which is not significant in EIA terms.
- 17.1.12. Cumulative impacts arising from the Proposed Development together with other projects and plans were assessed and predicted to result in effects of negligible or moderate (beneficial) significance (not significant in EIA terms) on socioeconomics, tourism and recreation receptors and therefore no additional mitigation is considered necessary because the predicted impacts in the absence of mitigation is not significant in EIA terms.
- 17.1.13. In addition to the £239 million in Scottish expenditure and £259 million in rest of the UK expenditure during the construction phase, the Proposed Development is expected to spend £686 million in the EU, which is likely to include the manufacture of WTGs.
- 17.1.14. This is expected to lead to beneficial socio-economic effects, generating economic activity and supporting employment in the EU. While there are likely to be beneficial transboundary effects associated with the Proposed Development, given the size of the EU economy it is unlikely that these effects will be significant.

18. CLIMATE

- 18.1.1. Climate change refers to the long-term shifts in temperatures and weather patterns that are fundamentally driven by human activities.
- 18.1.2. Climate change in the context of the Proposed Development assessment can be considered in two parts:
- The effect of greenhouse gas emissions arising from the construction, operation and maintenance and decommissioning of the Proposed Development, which may contribute to climate change; and

- The potential effects of the future climate on the Proposed Development.
- 18.1.3. The greenhouse gas emissions arising from, and avoided by, the Proposed Development were characterised via a series of desk-based assessments and articles using published data to determine the impact of the Proposed Development on climate change. The potential risks of the Proposed Development from a changing climate have also been assessed and reported in a risk assessment format, with the future climate conditions characterised using Met Office modelling.
- 18.1.4. Historic climate data from the Met Office for the period 1981-2001 was used to determine the current baseline using the spatial parameters defined by the Study Area.
- 18.1.5. Scotland has experienced an upward trend in mean annual temperatures. Specifically, the most recent decade (2013–2022) has been 0.2°C warmer compared to the 1991–2020 average and 1.1°C warmer relative to the 1961–1990 baseline.
- 18.1.6. The annual rainfall intensity in Scotland has slightly increased, with values showing a marginal rise from 7.4 millimetres per day (mm/day) during 1961–1990 to 7.8 mm/day in 2013–2022.
- 18.1.7. Scotland saw a 52% increase in rainfall during February over the 1961–1990 baseline, reflecting a broader trend of increased precipitation intensity during the colder months.
- 18.1.8. Wind speeds have shown no significant long-term change, maintaining a consistent annual mean wind speed around 11.2 knots (kt) in recent years. Notably, the named storms Malik and Corrie brought extreme wind speeds in January 2022, with gusts exceeding 100 kt on Scotland's mountain summits.
- 18.1.9. Sea level around Scotland is rising, in line with global trends. The rate of sea-level rise since the 1960s has increased to approximately 2.4 ± 0.3 millimetres per year (mm/year). Notably, the period from 1993 to 2022 saw an increase in sea level by 11.4 cm around the UK, indicative of accelerated sea-level rise during recent decades.
- 18.1.10. In the UK, for the foreseeable future, the marginal mix technology is expected to be gas, namely Combined Cycle Gas Turbine (CCGT) which has a carbon intensity of about 371 grams per kilowatt-hour (g/kWh)³. Alternatively, RenewableUK recommends using the DUKES “all non-renewable fuels” (coal, oil, gas and other solid fuels including non-renewable waste) emission factor of 424g/kWh¹. These are the baseline emission factors that the windfarm should exceed.
- 18.1.11. Several potential impacts on climate change receptors due to the construction, operation and maintenance, and decommissioning phases of the Proposed Development, were identified. These potential impacts include:
- Increased health and safety risk during construction due to high winds, increased temperatures, and/or high waves;
 - Risk of damage to project infrastructure assets due to rising sea levels, increased wave height, increased salinity, decreased pH levels and/or increased humidity;
 - Risk of scouring or structural damage in relation to OEP(s) due to rising sea levels altering hydrodynamics of the marine environment leading to an exacerbation of scouring on the offshore foundations; and
 - Risk of changes in wind activity affecting power output of WTGs due to high wind speed (above the cut-out wind speed) or low wind speed (below the cut-in wind speed).
- 18.1.12. With the embedded commitments in place, all identified impacts result in effects of negligible or minor (adverse) significance, which is not significant in EIA terms.

- 18.1.13. It is recognised that, when considered in conjunction with neighbouring renewable energy projects, e.g. ScotWind and Innovation and Targeted Oil & Gas, the Proposed Development will contribute to a combined mitigatory effect regarding the impacts of climate change. The cumulative contribution of these projects to the UK's carbon reduction commitments via their input of renewable energy into the grid will help to mitigate the impacts of climate change by lowering the levels of greenhouse gases emitted through energy production. It is, however, not possible to directly link any resulting reductions in greenhouse gas emissions to the specific climate change impacts experienced by the Proposed Development itself due to the global nature of climate change. Global emissions and the subsequent impacts of climate change are influenced by activities worldwide meaning that changes in climate impacts cannot be attributed to location-specific emission reductions. Similarly, emissions can be held in the atmosphere for extensive periods of time meaning that the temporal relationship between climate impacts and specific emission reductions is difficult to define. Consequently, cumulative effects have not been assessed as part of the climate change resilience or In-combination Climate Change Impact assessment.
- 18.1.14. Cumulative Effects in relation to Greenhouse gases have been scoped out of the assessment.
- 18.1.15. The outcomes of the In-combination Climate Change Impact assessment concluded that climate change is not likely to affect the conclusions made by other Chapters contained within this EIAR.

19. INFRASTRUCTURE AND OTHER USERS

- 19.1.1. The Infrastructure and Other Users assessment considered the impact of the Proposed Development on the following:
- Recreational sailing and motor cruising;
 - Kite surfing, surfing and windsurfing;
 - Sea/surf kayaking and canoeing;
 - Scuba diving;
 - Recreational fishing;
 - Other offshore wind farm projects;
 - Offshore telecommunications cables and subsea cables;
 - Disposal sites; and
 - Oil and gas operations (including pipelines) and additional renewable energy projects.
- 19.1.2. There are two operational offshore renewable energy projects within 10 nm (18.52 km) of the Proposed Development. These are Hywind Scotland Pilot Park and the Aberdeen Offshore Wind Farm (also known as the European Offshore Wind Deployment Centre). There are no offshore tidal sites or offshore wave energy developments within 10 nm of the Proposed Development.
- 19.1.3. There are three active subsea cables (telecommunication and power transmission cables) within 10 nm of the Proposed Development. These are Tampnet Central North Sea fibre optic cable, the Hywind Scotland Pilot Park export cables, and the Aberdeen OWF export cables.
- 19.1.4. There are ten disposal sites which are in within 10 nm (18.52 km) of the Proposed Development, with only one open site within 1 km of the Proposed Development (Peterhead (CR070)).

- 19.1.5. The Proposed Development is in the Central North Sea, a well-developed area for oil and gas infrastructure. These infrastructures include pipelines, wells, and surface and subsurface structures.
- 19.1.6. There are no extant oil and gas licences blocks, two subsea structures and four pipelines (Forties C to Cruden Bay (PL8), Forties C to Cruden Bay (PL721), 20" Gas Fulmar A – St Fergus (PL208), and Miller To St. Fergus (PL720)) within 1 km of the Proposed Development.
- 19.1.7. Five potential impacts on infrastructure and other users receptors due to the construction, operation and maintenance, and decommissioning phases of the Proposed Development, were identified. These were noted as:
- Temporary obstruction to other OWFs;
 - Temporary obstruction to subsea cables, utilities, developments and associated activities;
 - Temporary obstruction to licensed marine disposal sites and associated activities;
 - Temporary obstruction to oil and gas developments and associated activities; and
 - Displacement of recreational sailing and motor cruising, recreational fishing and other recreational activities due to infrastructure, safety zones, and construction vessels in relation to the Proposed Development may result in a loss of recreational resource.
- 19.1.8. With the proposed embedded commitments in place, all identified impacts result in effects of negligible or minor (adverse) significance, which is not significant in EIA terms.
- 19.1.9. Cumulative impacts arising from the Proposed Development together with other projects and plans were assessed and predicted to result in effects of negligible or minor (adverse) significance (not significant in EIA terms) on infrastructure and other users receptors and therefore no additional mitigation is considered necessary because the predicted impacts in the absence of mitigation is not significant in EIA terms.
- 19.1.10. No likely significant transboundary effects with regard to infrastructure and other users from the Proposed Development on the interests of other EEA States were predicted.

20. MAJOR ACCIDENTS AND DISASTERS

- 20.1.1. The major accidents and disasters assessment considered the potential for the Proposed Development to cause, and the vulnerability of the Proposed Development to, major accidents and/or disasters.
- 20.1.2. A major accident is defined as an event that threatens immediate or delayed serious environmental effects on human health, welfare and/or the environment and requires the use of resources beyond those that of the client or its appointed representatives (i.e. contractors) to manage.
- 20.1.3. A disaster is a man-made/external hazard (such as an act of terrorism) or a natural hazard (such as an earthquake) with the potential to cause an event or situation that meets the definition of a major accident. A major accident may be caused by a disaster.
- 20.1.4. The baseline presented for major accidents and disasters is based on a summary of the information collected through a detailed desktop review of existing studies and datasets for other topics such as commercial fisheries, shipping and navigation, military and civil aviation, climate, and infrastructure and other users.

- 20.1.5. The major accidents and disasters assessment of effects has followed the methodology that directs the assessment to focus on the likelihood but potentially high consequence events such as major spill, explosion, fire etc. (IEMA, 2020).
- 20.1.6. Several potential impacts on major accident and disaster receptors due to the construction, operation and maintenance, and decommissioning phases of the Proposed Development, were identified. These potential impacts include:
- Collision and allision risk;
 - Subsea cable and seabed anchoring snagging risk;
 - Extreme weather events (lightning strikes, high winds, storm surges);
 - Electrical, system failure and/or fire risk; and
 - External industrial hazards (i.e. major accidents at nearby development).
- 20.1.7. In EIA terms, there are no likely significant effects identified in relation to major accidents and disasters.
- 20.1.8. There is a potential requirement to tow floating substructures during construction, operation and maintenance and decommissioning phases. In terms of the cumulative effects of towing substructures, it is predicted that standard mitigation will be in place across all other offshore wind farms within the vicinity of the Proposed Development and therefore no likely significant cumulative effects have been identified.
- 20.1.9. As no likely significant effects relating to major accidents and disasters after consideration of embedded commitments, no transboundary or inter-related effects assessments were carried out.

21. REFERENCES

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